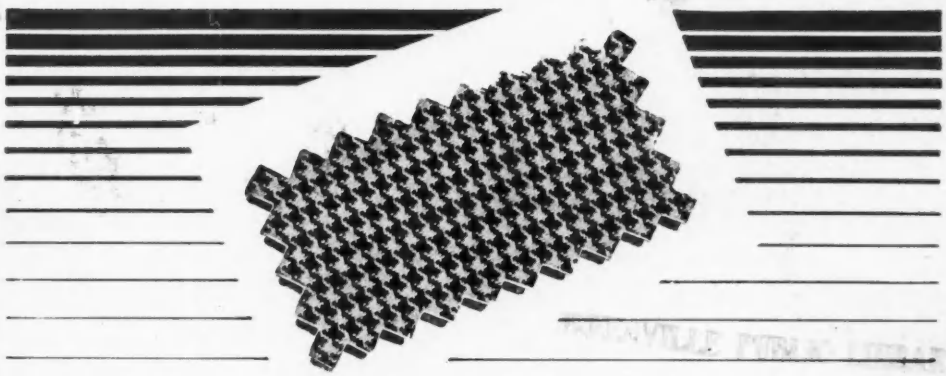
DEVOTED TO
TEXTILE CHEMISTRY
AND
WET-PROCESSING
BLEACHING
DYEING
PRINTING
FINISHING

JUNE 27, 1949
VOLUME 38, No. 13

AMERICAN DYESTUFF REPORTER

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS



How would you dye it?

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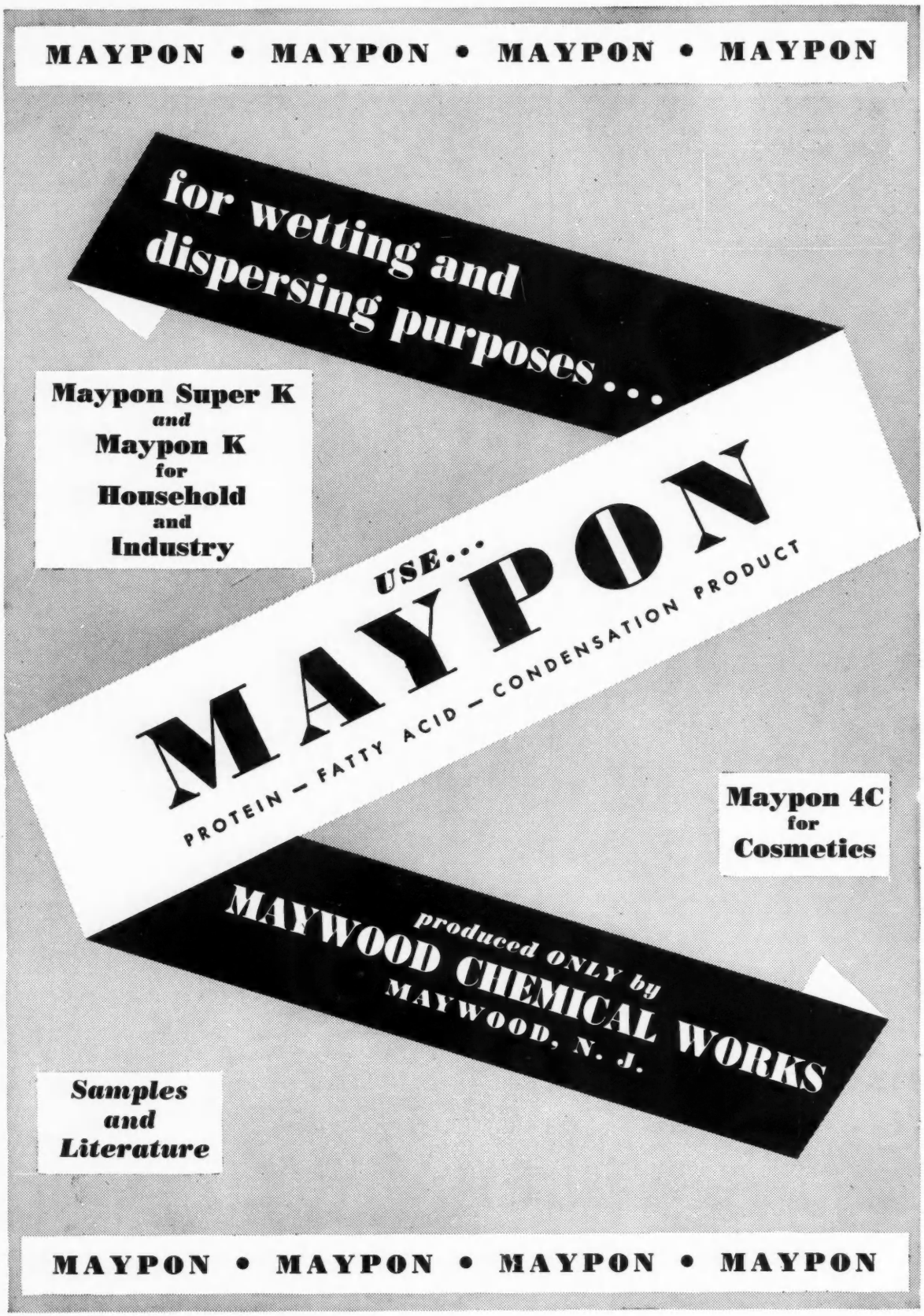
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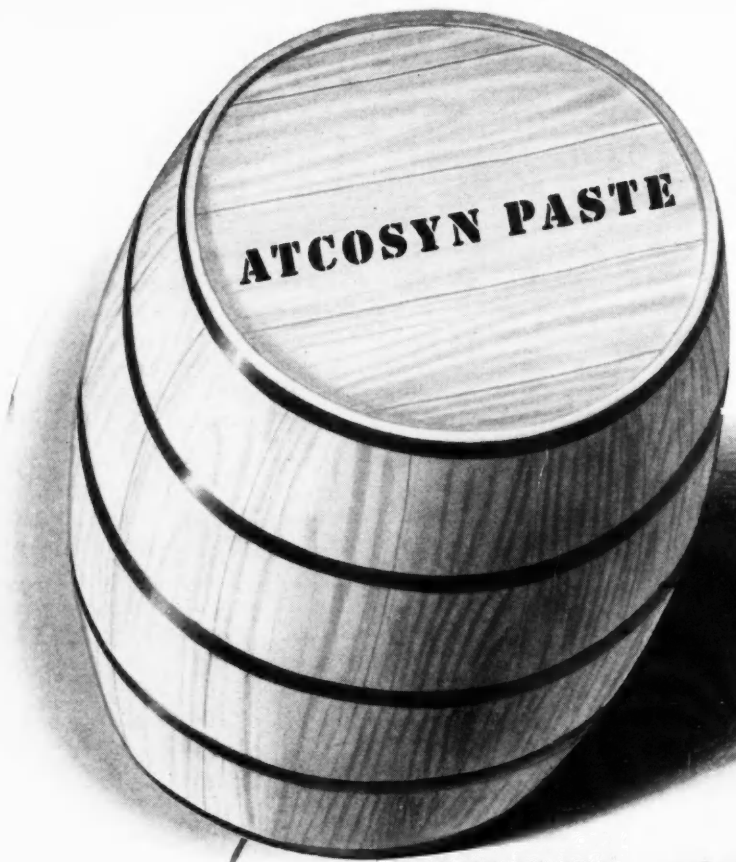

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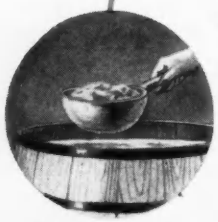

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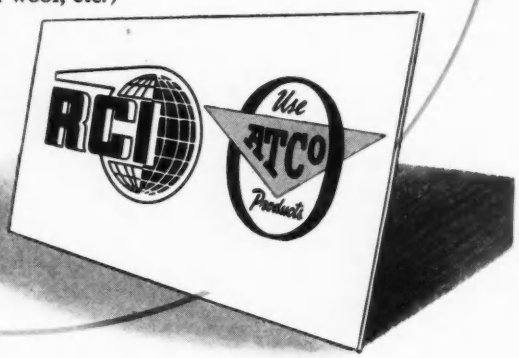

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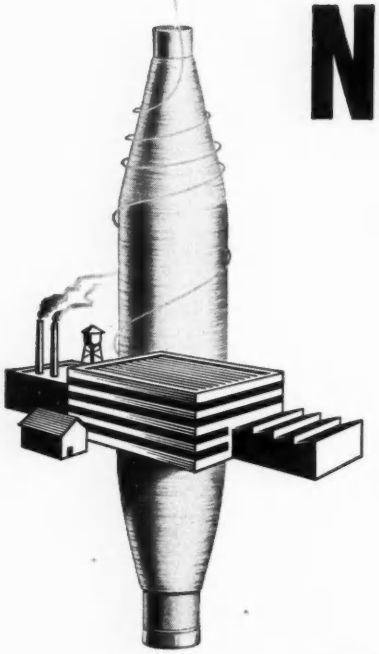

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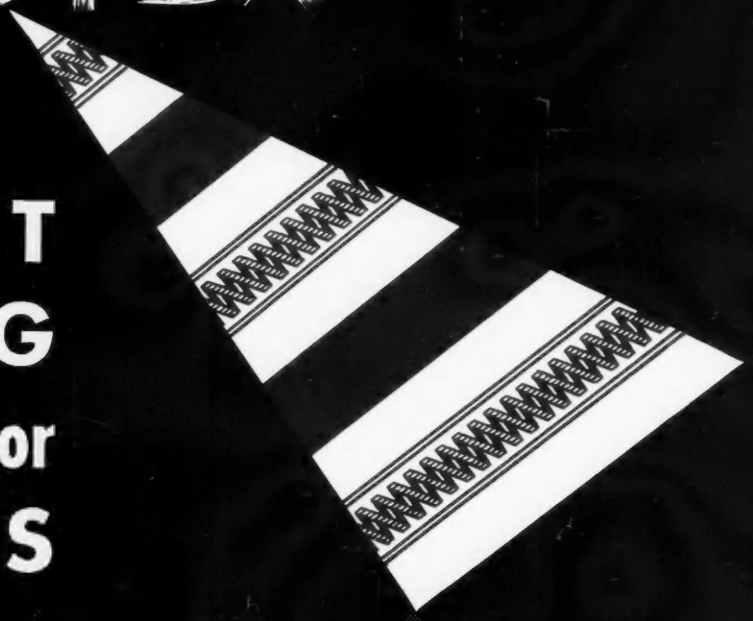
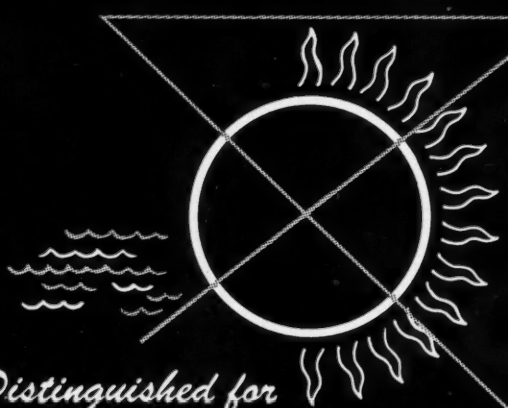


PIGMENT PRINTING COLORS for TEXTILES



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Technical GLYCERINE NEWS

FLAME-RESISTANT WORK UNIFORMS may now be made by use of an alkyd resin, according to the report of a government research laboratory. The alkyd (an important end-product of glycerine) is said to impart good laundering-resistance as well. (T-7)

★ ★ ★

TO PREVENT CLOGGING OF PRINTING SCREENS due to thickening agents which tend to dry, add glycerine to the print colors, one authority suggests. (T-8)

★ ★ ★

FOR SHARP PRINTS ON TEXTILES, a water-in-oil emulsion is claimed to be superior to the starch pastes used with conventional dyestuffs. A typical composition contains an aqueous dyestuff solution emulsified into a water-immiscible solution of film-forming substances, one of which is an alkyd resin. (T-9)

★ ★ ★

LONGER LIFE FOR NYLONS. Glycerine has become an important help in handling nylons in factory and retail store, according to an article published recently. Applied to the hands of machine operators and clerks, glycerine is said to prevent many of the snags which send a considerable proportion of the stockings to the scrap pile. (T-10)

★ ★ ★

A FUNGUS-PROOFING COMPOSITION for treating fibers made from cellulosic substances contains a hydroxyquinoline and an alkyd resin among other ingredients. Alkyds are important end-products of glycerine. (T-11)

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I should like to know the source of those items appearing in Technical Glycerine News which I have checked below.

☐ T-7 ☐ T-8 ☐ T-9 ☐ T-10 ☐ T-11

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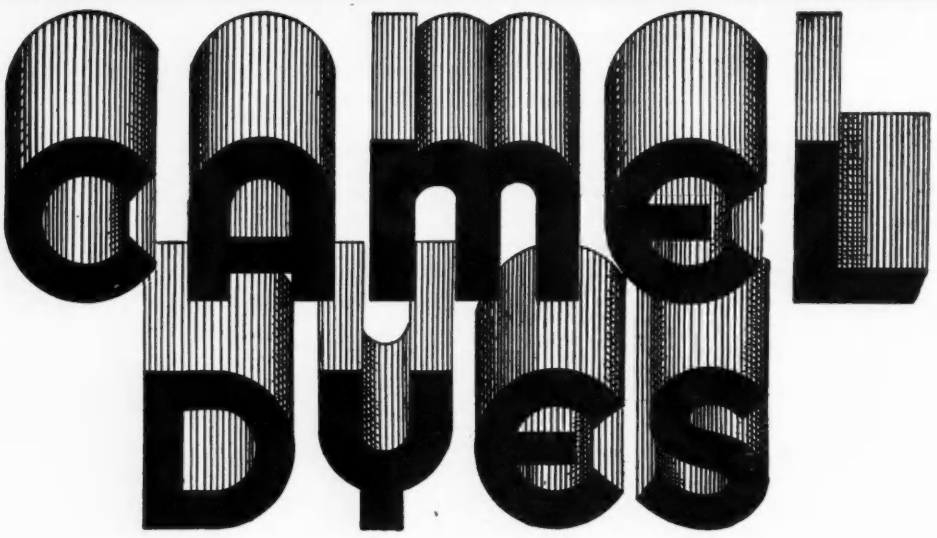

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JUNE 27, 1949

VOLUME 38 NUMBER 13

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VOLUME 38 June 27, 1949 NUMBER 13

DIMENSIONAL CHANGES OF KNIT GOODS IN LAUNDERING

HAZEL M. FLETCHER, MARY ELLEN DUENSING and JANE F. GILLIAM
Textile Physicist *Formerly Home Economist* *Textile Specialist*

Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, U. S. Department of Agriculture

DIMENSIONAL change of knit goods in laundering is of concern to manufacturer and consumer alike, since the serviceability of knit articles depends to a large extent upon how much they shrink or stretch when washed. However, the subject is one on which little research has been reported. The relationship between shrinkage and construction of fabrics knit from various fibers needs further study. Dutton investigated the shrinkage in knit wool fabrics and garments made therefrom *(1)*, but few data are available with respect to dimensional change in other knit goods.

In order to compare the differences in dimensional stability of knit fabrics of various constructions and to measure the effect of repeated launderings upon the shrinking and stretching of these materials, the Bureau of Human Nutrition and Home Economics undertook the study reported in this paper. Changes of width and length in five launderings were determined of plain knit and plated fabrics, knit with 32 and 40 courses per inch from cotton, wool, viscose rayon, and nylon yarns.

Materials

The 16 fabrics included in this study were knit in the Bureau's laboratory on a 42-gauge full-fashioned hosiery machine. The following four types of commercial yarns were used:

36/1 medium staple combed Peeler mercerized cotton.
1/52 wool.
150 denier filament viscose rayon.
150 denier filament nylon.

The yarn twist of the cotton was 17 turns per inch, and that of the wool was 15 turns per inch. The continuous filament viscose rayon and nylon as purchased had little twis . These were processed with a waxed treatment and given a twist of approximately 10 turns per inch in order to facilitate knitting.

Half of the fabrics were plain knit and half were plated. In each of these groups were fabrics having 32 courses per inch and fabrics having 40 courses per inch (Table I). One yarn was laid so that it appeared only on the purled side of the material while the other was guided to the knitted side of the fabric.

Procedure

Test specimens, 12 inches by 12 inches, were used in making the measurements to determine dimensional changes in laundering. Three 5-inch lengths were marked in both the lengthwise and crosswise directions of the specimens before they were degreased and laundered. An average of three replicates from each of the 16 fabrics was used for each value reported.

The method used for measuring the dimensional change was that devised by

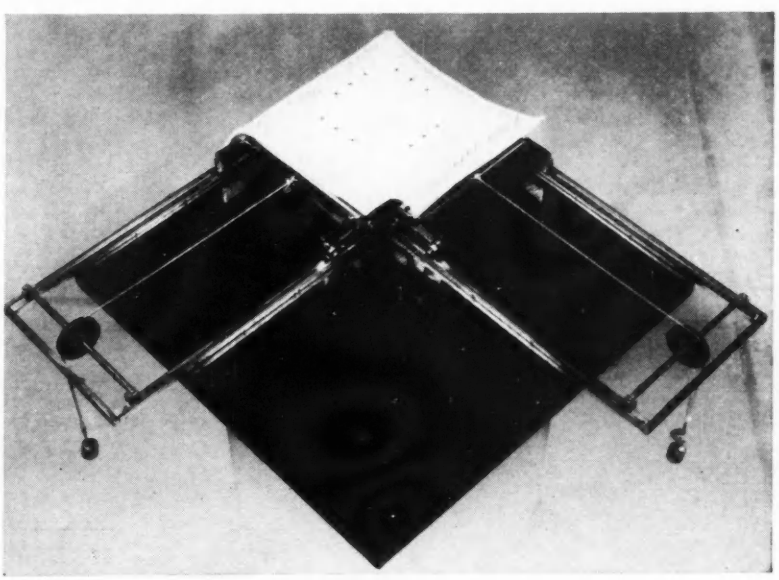

Figure 1
Apparatus used in the determination of dimensional changes of knitted goods.

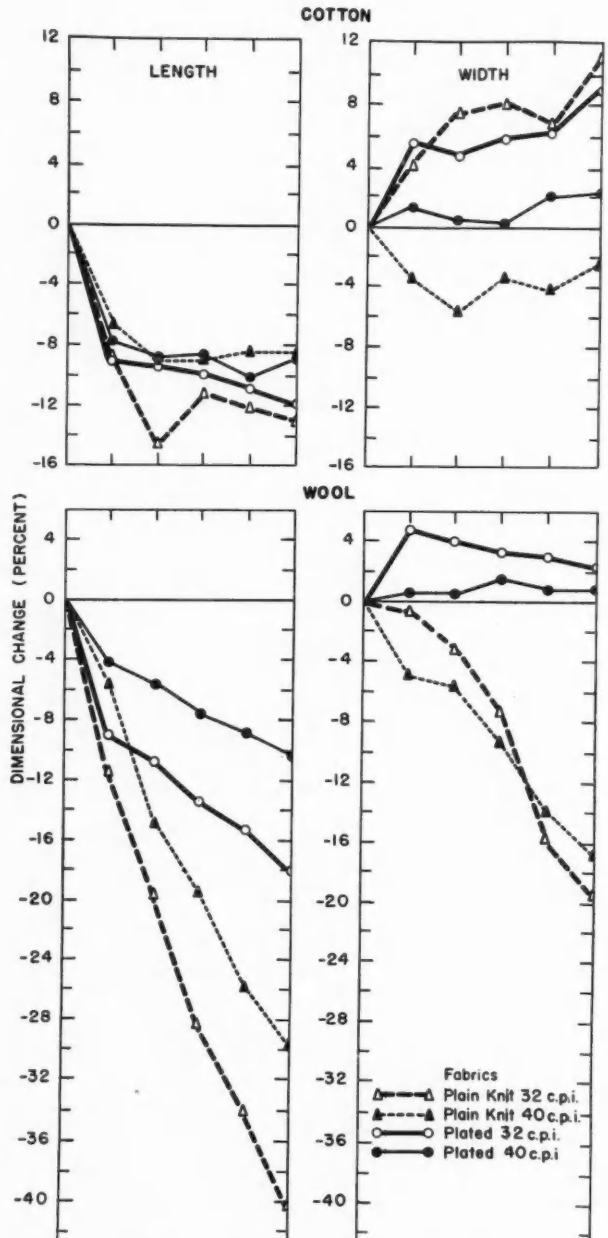

Figure 2

Dimensional change in length and width of cotton and wool, plated and plain knit fabrics, in five launderings.

TABLE I
Physical characteristics of knit goods

Fabric type	*Gauge[1] Number*	*Courses per inch Number*	*Weight per square yard[2] Ounces*
Plain knit:			
Cotton	42	32	3.3
Cotton	42	40	3.6
Wool	42	32	4.4
Wool	42	40	5.2
Viscose rayon	42	32	3.2
Viscose rayon	42	40	3.6
Nylon	42	32	3.1
Nylon	42	40	3.2
Plated:			
Cotton	42	32	4.4
Cotton	42	40	5.2
Wool	42	32	5.6
Wool	42	40	6.1
Viscose rayon	42	32	5.1
Viscose rayon	42	40	6.1
Nylon	42	32	5.3
Nylon	42	40	5.9

[1] Wales per 1½ inches.
[2] All specimens were conditioned for 4 hours at 70°F. and 65 percent relative humidity before weighing.

Fletcher, Hansen, and Duensing for evaluating the elastic properties of flat knit fabrics *(2)*. Until recently methods for measuring dimensional change were applicable only to hosiery and tubular knit goods *(4, 5, 6)* and were unsuited for determining change of dimension of a flat piece of knit material.

For marking and measuring changes in dimensions, the fabric was placed on pins of the apparatus used in evaluating the elastic properties of knit fabrics (Figure 1). A load of 50 grams was applied in each direction when measurements were made. This load was just sufficient to hold the fabric taut without distortion. Before any measurements were made the materials were allowed to come to equilibrium with an atmosphere having a relative humidity of 65 percent and a temperature of 70°F.

The marked specimens were immersed for one hour in an organic solvent to dissolve the waxes, both natural and applied, and rinsed in distilled water at 100°F. They were then laundered for 30 minutes with a 0.5 percent solution of neutral soap in distilled water at 100°F., in a small washing machine having a rotating cylinder 12 inches high and 9 inches in diameter. The fabrics were rinsed three times in distilled water at 100°F., squeezed out by hand and laid out smoothly, without stretching, on a flat surface to dry.

Results

Changes in length and width which occurred with five successive launderings of the 16 knit fabrics, are shown in Figures 2 and 3. All the materials shrank in length except the plated nylon fabric knit with 40 courses per inch. The plain rayon and the plain and plated cotton fabrics knit with 32 courses per inch stretched progressively in width with repeated laundering. The plated rayon and nylon fabric having 40 courses per inch shrank in width 4 and 6 percent, respectively, with the first washing but little more thereafter.

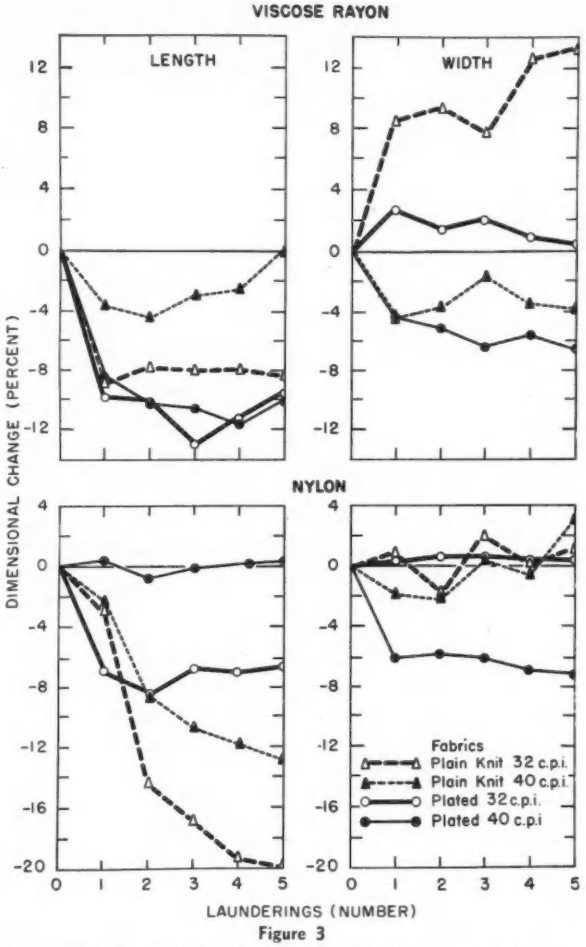

Figure 3

Dimensional change in length and width of viscose rayon and nylon, plated and plain knit fabrics, in five launderings.

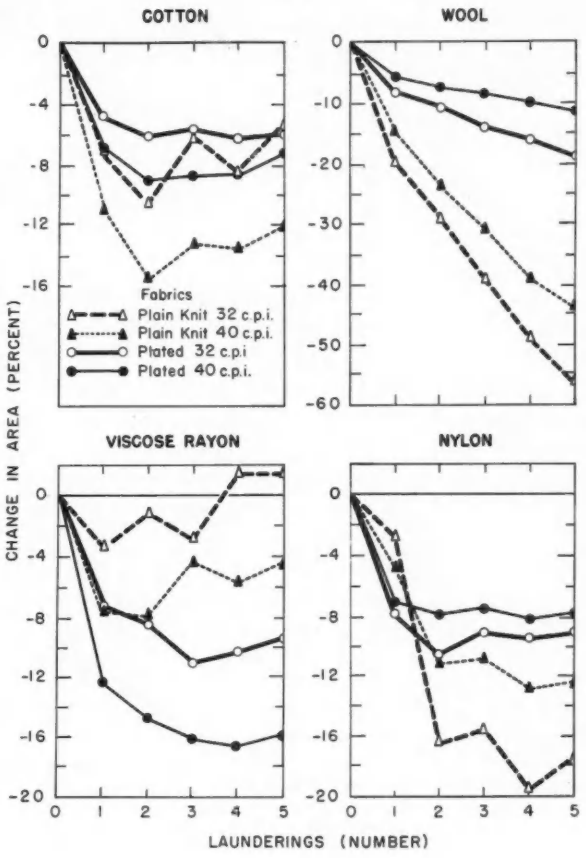

Figure 4

Change in area of cotton, wool, viscose rayon and nylon, plated and plain knit fabrics, in five launderings.

The nylon fabrics changed the least in width of any of the four fiber groups. In length three of the four nylon fabrics shrank as much as or more than the cottons and rayons. The wool fabrics exhibited excessive shrinkage in length; three of the four shrank considerably more than 10 percent. In the cotton and rayon groups dimensional change ranged between 14 percent stretch to 6 percent shrinkage in width and 0 to 14 percent shrinkage in length.

In the nylon and wool groups less shrinkage occurred lengthwise in the plated fabrics than in the plain knit materials, but the reverse was true in the rayons. The plain knit and plated cottons were not distinctly different in lengthwise shrinkage.

With the exception of the plated rayon less lengthwise shrinkage occurred in the fabrics of 40 courses per inch than in those of 32 courses per inch. These results are in line with those reported on shrinkage of wool knit fabrics by Dutton, who stated that length relaxation increases and width relaxation decreases with a decrease in the number of courses per inch *(1)*.

Lengthwise shrinkage in the cotton, wool, and rayon knit fabrics was considerably higher than that in certain plain woven fabrics of cotton, wool, and viscose rayon which were laundered by standard test procedures in the Bureau's laboratory *(3)*. Most of those woven cottons and rayons shrank less than 8 percent in length, whereas all but one of the knit cottons and rayons shrank between 8 and 14 percent in length. In a group of five woven wool materials four shrank approximately 15 percent and the other 27 percent in length as compared with 30 and 40 percent lengthwise shrinkage in the two plain knit fabrics.

With one laundering the decrease in area was less in the plated than in the plain knit wool fabrics. The reverse was true for the nylon fabrics. With successive launderings the change in area was less for the plated than the plain materials in both the wool and nylon groups. The decrease in area in these groups was less in fabrics knit with 40 courses per inch than those knit with 32 courses per inch. On the other hand, the cotton and rayon groups, both plain knit and plated, with 32 courses per inch decreased less in area than those knit with 40 courses per inch. The area of the plain knit rayons decreased less than the plated rayons. The plain knit cotton fabric of 40 courses per inch decreased more in area than any of the other three cotton materials. The changes in area of the plated cotton, wool, rayon, and nylon fabrics were similar. The decrease in area in the plain knit wools was far greater than in similar fabrics of other fiber content.

Summary

Results of this study show that dimensional change of the knit goods in laundering varied with the type of construction, with the number of courses per inch, and with the fiber content. Knitted fabrics usually shrank more in length than woven fabrics of similar fiber content.

(*Concluded on Page* 512)

AN INVESTIGATION OF METHODS OF TESTING FOR MOISTURE IN WOOL*

GEORGE C. LeCOMPTE and HENRY H. LIPP

Production and Marketing Administration, Livestock Branch, U. S. Department of Agriculture, Washington 25, D. C.

Problem

ACCORDING to customary methods of testing for moisture, a sample of the material in question is subjected to an elevated temperature. Its weight is recorded at succeeding intervals. When the weight has arrived at a constant low value, the sample is considered to be dry, and the loss in weight is assumed to be the moisture content of the sample. This custom is widespread in chemical laboratories. Such a test might yield results close to the truth, but clearly could not have any absolute significance when the material under test is in equilibrium with the moisture-laden atmosphere. Moisture testing by heating the sample is quick and easy, and suitable apparatus is abundantly available. Nevertheless, it still appears advisable for textile chemists to have some idea of the absolute significance of their results. Accordingly, some work was done to attempt to assess the absolute accuracy of various customary drying procedures.

Experimental Details

Five techniques were investigated. In every case scoured wool was the material whose moisture content was investigated. Four separate samples were used. By one technique 2-gram samples held in tared weighing bottles were placed in a suitable container along with another container containing a large surface of freshly exposed P_2O_5 and the whole set up was subjected to a vacuum of 4-5 mm. mercury total pressure. The weights of the samples so exposed to a high vacuum over P_2O_5 were determined at successive intervals until it appeared that constant weight had been obtained.

By another technique 50-gram portions were hung in baskets in a typical conditioning oven. The oven was held at 110°C. and the atmosphere within the oven circulated by means of a fan. Here, too, the weights of the samples were observed at successive intervals until constant weight was reached.

By the third technique samples weighing 150 grams were dried in suction dryers developed in the U. S. Department of Agriculture. In these dryers samples weighing 150 or 200 grams were held in sizeable metal cans equipped with perforated bottoms. The cans sat on vacuum ports in an oven held at 150°C. The hot air inside the oven was sucked thru the sample. Periodically the samples were weighed while still hot and still inside the oven on an accurate balance on the oven. Fresh air was constantly introduced into the oven. Heatings and weighings were repeated until the sample came to constant weight.

By the fourth technique samples weighing 150 grams were dried in forced draft ovens with the normal upper operating temperature set at 150°C. After drying, the sample was capped to prevent free entrance of the more or less humid outside atmosphere, allowed to cool to room temperature, and then weighed. This heating, cooling, and weighing was repeated until constant weight was obtained.

By the fifth technique 50-gram samples were placed in 2-liter round bottom flasks along with 300-400 mls. toluene saturated with water. The flasks were connected with a moisture-distilling receiver and this receiver to a straight condenser. The moisture in the sample of wool was removed by boiling the sample with the toluene. The moisture so removed was condensed and trapped in the moisture-distilling receiver and, of course, it could be read off directly. The results obtained are shown in Table I.

Discussion

In Table I it will be noted that the the lowest results on the average are given by the vacuum drying over P_2O_5. The other extreme is found in the results obtained by toluene distillation. The toluene results average 0.56% higher than the vacuum drying moisture findings.

Vacuum drying over P_2O_5 should give complete findings for moisture, provided that sufficient time is allowed for the moisture-laden wool to give up *all* its moisture and thus come into equilibrium with the unreacted P_2O_5 which, theoretically, allows no moisture to remain in the atmosphere above it. However, it is a matter or great practical difficulty to be sure that the samples being dried in vacuum over P_2O_5 have been given sufficient time to dry completely. As a matter of fact, the samples in these experiments were still losing as much as 0.05% moisture in 24 hours when the experiments were discontinued. Possibly, the final results would have had absolute significance if the experiments had been continued for days or weeks longer. However, a method which apparently required as much as 72 hours to approach constant weight was not considered to be particularly useful. Therefore, experiments with

(*Concluded on Page* 512)

TABLE I

Percentage of moisture in scoured wool, as found by five different methods

Drying Method or Apparatus	*Test No.*	*Moisture Findings on Sample* 1 %	2 %	3 %	4 %	*Ave.* %
Vacuum over P_2O_5	1	6.87	5.36	6.85	6.35	
	2	7.16	5.35	6.94	6.29	
	3	7.37	5.16	6.84	6.35	
	Ave.	7.13	5.29	6.88	6.33	6.41
Conditioning Oven 110°	1	7.04	5.38	6.70	6.30	
	2	7.16	5.46	6.92	6.24	
	3	7.28	5.32	6.90	6.28	
	Ave.	7.16	5.39	6.84	6.27	6.42
U.S.D.A. Suction Drier	1	7.27	5.60	7.00	6.47	
	2		5.73		6.43	
	3		5.67		6.30	
	Ave.	7.27	5.67	7.00	6.40	6.59
Forced Draft Drier	1	7.40	5.67	7.20	6.27	
	2	7.27	5.73	7.17	6.50	
	3	7.33	5.60	7.10	6.53	
	Ave.	7.33	5.67	7.16	6.43	6.65
Toluene Distillation	1	7.80	6.00	7.48	6.76	
	2	7.78	5.94	7.36	6.76	
	3	7.74	5.80	7.60	6.60	
	Ave.	7.77	5.91	7.48	6.71	6.97

* A communication to the A.A.T.C.C.

Proceedings of the
American Association of Textile Chemists and Colorists

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JUNE 27, 1949

Report of Bradford Durfee Technical Institute Student Chapter

THE first Annual Dinner meeting of the Bradford Durfee Technical Institute Student Chapter was held at the Hotel Mellen, Fall River, Mass., Thursday evening, April 28, 1949. After the dinner addresses were given by Mr. Kelly, Dean Leslie B. Coombs, Dr. Watters, Dr. Severino and Mr. Wingate. WALE, local radio station, carried all the speeches on the air. After that a round table discussion was held and finally a moving picture on "Harnessing the Rainbow" was shown. The meeting was a great success.

Respectfully submitted,
RICHARD PAUL BARBER,
Secretary

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Report of Pacific Southwest Section

THE Southwest group of the Pacific Coast Section held a technical meeting and dinner on May 13th, 1949, at the Mona Lisa Restaurant in Los Angeles, California.

Dinner was served at 7:00 P.M., with fifty-four members and guests present. Immediately following, Chairman Frank P. Brennan called the business meeting to order. Results on the balloting for the Section's officers for the coming year were announced. Officers were elected as follows:

Chairman:—Hubert A. Des Marais, General Dyestuff Corp., San Francisco, Calif.

Vice Chairman:—Russell B. Coleman, National Dyeing & Finishing Corp., Culver City, Calif.

Treasurer:—Charles H. Dunker, Charles H. Dunker Co., Los Angeles, Calif.

Secretary: — Frederick L. Wilhelm, American Aniline Products, Inc., Los Angeles, Calif.

Sectional Committee:—Stewart Bone, John R. Roscow, Frank G. Hubener, Otto E. Schmidt.

Councilor: Frank P. Brennan.

It was agreed to hold an outing on July 23rd. Members will be notified of the location selected.

Sandoz Chemical Works, Inc., sponsored the showing of a colored sound film entitled "Meta Chrome Story". Following the showing of the film David F. Driscoll discussed the workings of this process and answered questions presented by the members.

The meeting adjourned at 10:00 P.M.

Respectfully submitted,
F. L. WILHELM,
Secretary

CALENDAR

PHILADELPHIA SECTION
Meetings: September 16, November 11 (Kugler's, Philadelphia).

PIEDMONT SECTION
Meeting: November 5 (Charlotte Hotel, Charlotte, N. C.

HUDSON-MOHAWK SECTION
Meetings: September 16, November 18.

COUNCIL
Meetings: Sept. 9, Dec. 9.

RESEARCH COMMITTEE
Meetings: Sept. 9, Dec. 9.

NATIONAL CONVENTIONS
1949: October 13 to 15, Chalfonte-Haddon Hall, Atlantic City.
1950: Portsmouth, N. H.
1951: October 18 to 20, Statler, New York.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

49-11

Education: B.T.C., Lowell Textile Institute.

Experience: Superintendent of Dyeing and finishing, wool and other fibers.

Age 37; single but with dependents; references; New England preferred.

5-16, 5-30, 6-13, 6-27

49-12

Education: Pratt Institute, and City College of New York, chemistry.

Experience: Continous employment since 1920 as laboratory supervisor, dyer and mill chemist.

Age 49; married; references; position in southwest U. S. desired.

5-30, 6-13, 6-27, 7-11

49-13

Education: Lowell Textile Institute, B.T.C.

Experience: Laboratory and mill chemist, 1931 to date.

Age 41; married; references; position as plant chemist or executive, or in sales, desired.

5-30, 6-13, 6-27, 7-11

49-14

Education: B.S., Brooklyn College, now completing year in Bradford Durfee Technical Institute.

Experience: Instrument specialist, U. S. Army Air Corps.

Age 25; married; position as dyestuff or textile chemist near New York, or elsewhere on Atlantic Coast, desired.

5-30, 6-13, 6-27, 7-11

49-16

Education: Chemist.

Experience: Dyer, hosiery.

Age 54; married; references. Southern U. S. preferred.

6-27, 7-11, 7-25, 8-8

49-17

Education: New Bedford Textile Institute.

Experience: 16 years chemist, dyer and head dyer, cotton and rayon.

Age 40; married; references. Eastern U. S. preferred.

6-27, 7-11, 7-25, 8-8

49-18

Education: B.S., Mass. Inst. of Tech.; further courses elsewhere.

Experience: Textile chemical, laundry and garment analysis, including executive and sales service work.

Age 41; married; references; now located in middle west.

6-27, 7-11, 7-25, 8-8

Mid-West Section—

INNER WORKINGS OF A.A.T.C.C. RESEARCH*

J. ROBERT BONNAR

Technical Director, General Dyestuff Corporation
Chairman, A.A.T.C.C. General Research Committee
Chairman, A.A.T.C.C. Executive Committee on Research

WHEN I was approached to speak to you this evening on the subject of A.A.T.C.C. research, I was hesitant in accepting because of the fact that I had covered this subject in a rather broad way in Chicago at the Annual Meeting in 1947, and I had again done so at the Annual Meeting in Augusta in 1948. I was told, however, that there were many of you who, because of distance and time, could not get to the Annual Meetings, and would therefore appreciate information as to the functions of their Association. I would ask that those of you who did attend the Annual Meetings bear with me with the repetition of some of my statements tonight.

I believe that you all know that a little more than twenty-five years ago a small band of textile chemists who had the courage to start, and who had the vision to realize the necessity of such an association, finally got under way, and this small group has now grown to the size of some six thousand members. It was not long after the formation of the Association that these technicians of the textile industry realized that a great help to the industry would be the setting up of standard test methods. They therefore, on a voluntary basis, started to work on light fastness, perspiration fastness, wash fastness and chlorine fastness. Interest in their work carried them on, and we are now faced with the proposition of having, either in operation or as reference committees, some forty groups of people carrying out this work.

It was not long before it was realized that there would have to be some head and control to the research, and therefore there was set up under the Council a General Research Committee with the late Professor Olney as Chairman. He, of course, having been the Founder of the Association, was as well versed in what its functions should be as anyone, and the technical part of it, that is, the research committees, was one of the most important functions. The General Research Committee as set up is still functioning as it did in those days; that is, accepts the reports, sees to it that committees carry on their work, and makes decisions which are brought to the Council for adoption or revision when a matter of policy is involved, or the matter of setting up a standard test method is involved.

The Association grew so large, and the number of working research committees became so numerous, that the load became increasingly difficult for Professor Olney to carry, and about six years ago a special committee was formed to look into the matter of relieving the pressure on the one man who had done such an outstanding and noteworthy job. The idea of an Executive Committee on Research was evolved, and this was set up to be the steering or governing committee of the research committee. This is composed of the Past President, the Present President, the Chairman of the General Research Committee, and three members-at-large elected for three years each, but staggered so that only one of these members-at-large would go off at any one time.

It also became evident some years ago that due to the pressure of business, as well as the type of investigations being carried on, that voluntary contributions of time and functions could not take care of all of the problems facing us. Through good fortune we were able to obtain space at the Lowell Textile Institute, and thus gradually increased the budget for expenditures on research to cover a paid staff at the central laboratory at Lowell. The Association was fortunate in obtaining the services of Dr. Stiegler, who had sometime before that undertaken a special project for the A.A.T.C.C., and who had also been connected with the textile industry, and was thus interested on a personal basis in the Association.

It is his function to hold the strings which go to each Research Committee, taking steps to expedite their work as much as possible, cooperating with them in any way, seeing to it that the paid staff at Lowell does any desired work for these committees, as well as supervising the staff at the central laboratory. He, in other words, is the administrator in charge of the research work of the Association, whereas the Executive Committee on Research and the General Research Committee are like boards of directors.

We are very proud to say that the Association was well enough equipped with personnel to be called on by the Government some years ago to undertake several war projects. These were consummated with very satisfactory results to the Government branches for whom the work was done.

You must of course realize that the A.A.T.C.C. deals in no way with political propositions or matters of specifications, but only deals with the setting up of standard test methods in an impartial way with no ulterior motive. This includes investigations on a research basis of broad general problems which are of interest and, as deemed by the E.C.R. and the General Research Committee, of value to the textile industry.

Without any question, one of the most important functions of the A.A.T.C.C. is not only the setting up of standard test methods, but the making available of special equipment as is necessary to satisfactorily carry out these standard test methods after they have been set up. This not only covers such propositions as Fade-Ometer, Launder-Ometer, Gas Fading Apparatus, Crockmeter, and such physical machines, but also the making available of various test cloths such as the insect pest control cloth, the three-fiber test cloth, the six-fiber test cloth, detergency cloth, and the like.

One of the worries which the E.C.R. has had is the fact that with so many members of the Association, it is hard to find those who are willing and anxious to do volunteer work. The life-blood of the Association has been this volunteer work, and we are very certain that the majority of work should be on this basis rather than on a paid-staff-at-Lowell basis, although as mentioned before, there must

* Presented at meeting, Mid-West Section, May 7, 1949.

always be a paid staff of a certain size for such problems as cannot be done in other ways.

I have often said, and would like to repeat again particularly to those present tonight who are owners or managers and not too active in the Association and do not know in detail the functions, that these standard test methods and general research problems covered by the Association are worth many times more in dollars than what is contributed by them through corporate memberships, or in time and travel expense they allow their men.

The methods make available a common language and common ground for the production of standard goods irrespective of quality any one mill desires to produce, and allows duplicate results to be obtained on any test in question from day to day within the same laboratory, or by tests being carried out in different laboratories.

I furthermore would like to say to you owners and managers that the thought, that A.A.T.C.C. meetings represent a chance for your men to exchange trade secrets, is definitely a fallacy. I have been actively connected with this association work for over twenty years, and can honestly say that I have never yet heard a trade secret given, nor have I ever heard of one having been given. I am very pleased to say that this, shall I say old-fashioned idea, went out at the same time that the vest-pocket dyer practically lost his existence.

Your Association is at all times in contact and cooperating with, as well as giving valuable assistance to, various Government bodies, other associations such as A.S.T.M., N.A.I.D.M., S.P.I., A.S.A., and T.R.I. It furthermore, and this is a very important phase, is instrumental in educating the younger men, as their attendance at our meetings and the reading of various research committee reports in the *Dyestuff Reporter* does more toward broadening their knowledge that they can ever realize. They not only get this technical information which they need to do better jobs and thus improve their own standing, but will unconsciously get more serious-minded and learn how to think out correctly these problems through their contacts with the older, more experienced technicians, the majority of whom are actually the leaders in the chemical and engineering phase of the wet processing industry.

There have, from some sources, been questions as to when such committees as washing, light, etc., will finish their work, and I am glad to comment on this. As the times change, as new fibers come in, as new techniques of testing are developed, and as quality control changes, these committees will have to be cognizant of the changes and adopt our test methods to these changes. It therefore can well be recognized that these committees will never finish their work, and it should not be expected that they would.

I take as an example our wash committee, where several years ago our most drastic test was the equivalent of ten ordinary launderings. Commercial laundries, like all other industries in trying to advance to bring down costs, started using more chemicals than they had before, using higher temperatures, and what was worst of all, began to increase their loads which automatically decreased the liquor ratio. This really did a job, and we therefore had a tremendous amount of work to do in the washing committee to set up test methods which would be comparable with such present-day type of washing.

It soon became evident after the formation of the E.C.R. that with the size of the Association it was physically impossible for us to know all of the potential workers, plus the fact that there had to be some medium of gathering information from various Sections without sending a general questionnaire each time to six thousand members. The idea was thus evolved of setting up Sectional Advisory Research Committees in each Section. This was done, and since the formation, has been very helpful from the standpoint of the various committees making suggestions as to the proper men in their locality to work on any intended committee. In addition to this, they have started projects of their own on various research problems, as well as being very helpful in making literature surveys, some of which you have no doubt already seen in the *Dyestuff Reporter*. Aside from their help to the Research Committee, they have in many instances been very helpful to sectional committees set up for Intersectional Contest Papers.

As far as new endeavors are concerned, I might say that the chlorine retention committee which was recently formed is well under way and should be setting up tentative methods shortly. The snag resistance committee is very active. We are just forming a committee to set up testing methods for desizing compounds.

A recently formed committee on nomenclature and classification has just reported. This was very necessary so that standard methods would be available particularly for classification, as heretofore the top class in some tests was three, in others four, and others five. One, therefore, who is not too familiar with all of our test methods in seeing a rating of three would not know whether this was top class or whether it was a rating of three when a top rating was five for this particular test. They have all now been put on a standard basis of five as tops, with the exception, of course, of light which has always been with eight as a top.

There will be published shortly a report on stainless steel equipment. This investigation was made because request was made to the Executive Committee on Research, based on the fact that stainless steel equipment was not as satisfactory as it should be. Investigation brought out the fact that most of the trouble was due to taking any type of steel that was available during the war, but that in normal times, with the proper specification being drawn up by the purchaser as to the type of steel, and the proper specification as to welding at the seams, bearings, etc., the normal life of a stainless steel machine should be twenty to twenty-five years.

The E.C.R. is studying the subject of forming a committee to suggest to schools and colleges carrying textile courses, that the proper type of mathematics, engineering, textile chemistry, report writing, and the like, is covered to make them more useful to the industry.

I can well imagine that you no doubt feel this has been rather a heterogeneous collection of statements this evening, but I trust that I have given you enough of the background of the inner workings of your Association that you will realize what we art trying to do for you, as, after all, it is your Association, and it is for your information and education that the vast amount of work by your officers and research committee is being done.

—♦ ♦—

Report of Pacific Northwest Section

A MEETING of the Northwest group of the Pacific Coast Section was held on May 17th at the Mallory Hotel, Portland, Oregon.

Chairman H. A. Des Marais presided at the technical meeting following the dinner and outlined briefly the future activities of the Section on the Pacific Coast.

Sandoz Chemical Works, Inc., sponsored the showing of a colored sound film entitled "Meta Chrome Story". Following the showing of the film, David S. Driscoll discussed the workings of this process and answered questions from the members.

Thirty-seven members and guests attended the dinner and meeting.

Respectfully submitted,

F. L. WILHELM,
Secretary.

EXHIBITS AT ATLANTIC CITY CONVENTION

Floor Plan of Exhibit Area at Atlantic City Convention

TWENTY-SEVEN organizations had reserved space for the National Convention to be held in Atlantic City, October 13-15, according to figures released by the exhibit committee on June 10th.

Nearly 10,000 square feet of floor space has been set aside for the convention exhibition, which will be held at the Chalfonte-Haddon Hall, headquarters for the meeting.

As of June 10, the following firms had booked exhibit space for the convention:

H.W.BUTTERWORTH & SONS COMPANY.

E. I. du PONT de NEMOURS & CO., INC.

NATIONAL ANILINE DIVISION OF ALLIED CHEMICAL & DYE CORP.

TEXTILE BAG & SPECIALTIES COMPANY.

CALGON, INC.

GENERAL DYESTUFF CORPORATION.

ALCO OIL & CHEMICAL CORPORATION.

NATIONAL MILLING & CHEMICAL CO.

GENERAL ELECTRIC COMPANY.

ARTHUR H. THOMAS COMPANY.

AMERICAN DYESTUFF REPORTER.

SCHOLLER BROS., INC.

SANDOZ CHEMICAL WORKS, INC.

ROHM & HAAS COMPANY.

AMERICAN VISCOSE CORPORATION.

AMERICAN ANILINE PRODUCTS, INC.

TEXTILE WORLD.

JACQUES WOLF & COMPANY.

VENANGO MACHINE COMPANY.

CALCO CHEMICAL DIVISION OF AMERICAN CYANAMID COMPANY.

ATLAS ELECTRIC DEVICES COMPANY.

JOHN CAMPBELL & COMPANY, INC.

DAILY NEWS RECORD.

In addition, the A.A.T.C.C. will have a large exhibit showing the various testing instruments and methods which have been developed. The textile schools will have educational exhibits and reservations have already been made by the Philadelphia Textile Institute, Lowell Textile Institute and New Bedford Textile Institute.

Convention Notes

A QUESTION and Answer session will be held Saturday afternoon, October 15th by the Technical Program Committee for the Atlantic City Convention. Members are invited to submit questions on any subject of interest to the textile and allied industries. These should be sent to Arthur W. Etchells, Hellwig Dyeing Corp. and may be sent anonymously if the writer so desires.

This portion of the program is viewed by the convention committee as potentially one of the most interesting phases of the convention, if members will really use this session as a "clearing house" for their questions.

* * * * *

George Linberg, of the Northern New England Section, will be in charge of convention transportation for that section, it is announced.

Report of Committee for

NOMENCLATURE and CLASSIFICATION

THE Committee for Nomenclature and Classification was appointed last fall to suggest a uniform and consistent system for designating the degrees of fastness of dyeings and of other properties. It was envisioned that the recommendations would follow as far as possible the customs which have already grown up in the domain of designating fastness and other ratings and would be so simple and logical that our selections might well receive international acceptance. In our work we have therefore been guided by the preliminary recommendations of the Colour Index Committees of The Society of Dyers and Colourists and of the A.A.T.C.C. and by the past work of the I.V.C.C., the European international organization with sections (prewar—the present status is in flux) in Switzerland, Germany, Poland, Hungary, Holland, the Scandinavian countries, etc.

Your Committee has studied the problem of classifications and nomenclatures for fastness and other properties by correspondence and has nearly unanimously arrived at its present decisions, which follow. The one point where there was a complete lack of unanimity was the designation for the best, or Class 8, degree of fastness to light. The recommendations of the Committee were sent out on a letter ballot for acceptance by members of the Research Committee along with a special request for a choice between the four proposed names for the Class 8 degree of fastness to light. Acceptance by the Members of the Research Committee of the general report of your Committee was unanimous among the 54 who voted. As for the vote on the nomenclature for the Class 8 degree of fastness to light, the results were as follows:

maximum	18
outstanding	15
superior	16
superlative	5
Total votes	54

Now that the present recommendations have been adopted as the official nomenclature of the Association, it is expected that not only will the dyestuff manufacturers follow our system for their shade cards, but that the Association will use these terms and classifications for the interpretation of fastness tests before the Federal Trade Commission and before consumer organizations in general.

It will then be the business of others to interpret our technical nomenclature for the benefit of the consuming public in either the same or in simpler words.

Respectfully submitted by

Committee for Nomenclature and Classification,

CARL Z. DRAVES
Chairman.

* * * * *

Official Nomenclature for Fastness and Other Ratings

NUMBER OF DEGREES OF FASTNESS OF DYEING.—There shall be 8 degrees of fastness for light, with Class 8 the best in quality and Class 1 the poorest.

There shall be 5 degress of fastness for most other properties, with Class 5 the best in quality and Class 1 the poorest.

There shall be 3 degrees of fastness for a few properties where 5 steps seem excessive, with Class 5 the best in quality, Class 3 medium in quality and Class 1 the poorest in quality.

TERMS FOR FASTNESS TO LIGHT.—

Class
8 maximum
7 excellent
6 very good
5 good
4 fairly good
3 fair
2 poor
1 very poor

FASTNESS TERMS FOR MOST OTHER PROPERTIES.—

Class
5 excellent
4 very good
3 good
2 fair
1 poor

DEGREE OF STAINING OF EFFECT THREADS.—

Class
5 virtually unstained
4 slightly stained
3 considerably stained
2 heavily stained
1 dyed

EFFECT OF METALS ON DYEINGS.—

Class
5 virtually unchanged
3 slightly changed
1 considerably changed

DISCHARGEABILITY OF DYESTUFFS.—

Class
5 discharges white in all depths of shade.
4 discharges white in light and medium shades; slightly tinted in deep shades, or develops a slight tint in storage.
3 discharges sufficiently for printed colored effects but not for whites.
2 discharges poorly; not suitable for printed colored or white effects.
1 does not discharge (suitable for use in printing color discharges).

New York Section—

THE ELEMENTS OF COLOR AND SPECTROPHOTOMETRY*

EDWARD W. RHAEL

Sandoz Chemical Works, Inc.

ATTENTION was directed to the fact that instruments are now invading the field of industrial color appraisal, heretofore the exclusive province of human sensory judgment. It was suggested not only that this trend will continue but that the not too distant future may see the harnessing of these instruments or devices of a similar nature to provide automatic control of the dyeing process.

Of the variety of instruments available at the present time the spectrophotometer was selected for discussion because of the fundamental nature of its construction and principle of operation. Several graphs were projected upon the screen (Figs. 1 and 2) to illustrate the manner in which this instrument yields its analysis of materials which appear colored. The observation was made that the curves illustrated were drawn by coordinating reflectance or transmittance (i.e., light intensity) with the wavelength of light, and that for their proper interpretation it is necessary that they be considered with respect to the physical principles of color. Accordingly, the talk was divided into two general sections: a discussion of the physical theory of color together with a demonstration of the validity of its principles, and secondly, a description of the construction and operation of the spectrophotometer and a discussion of some of the properties and characteristics of spectrophotometric curves.

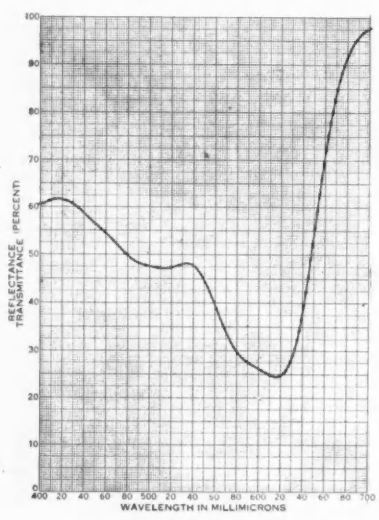


Fig. 1

The Physical Theory of Color

Commencing with a discussion of the mechanics of the process by means of which we see, the visual process was likened to the camera and the fact stressed

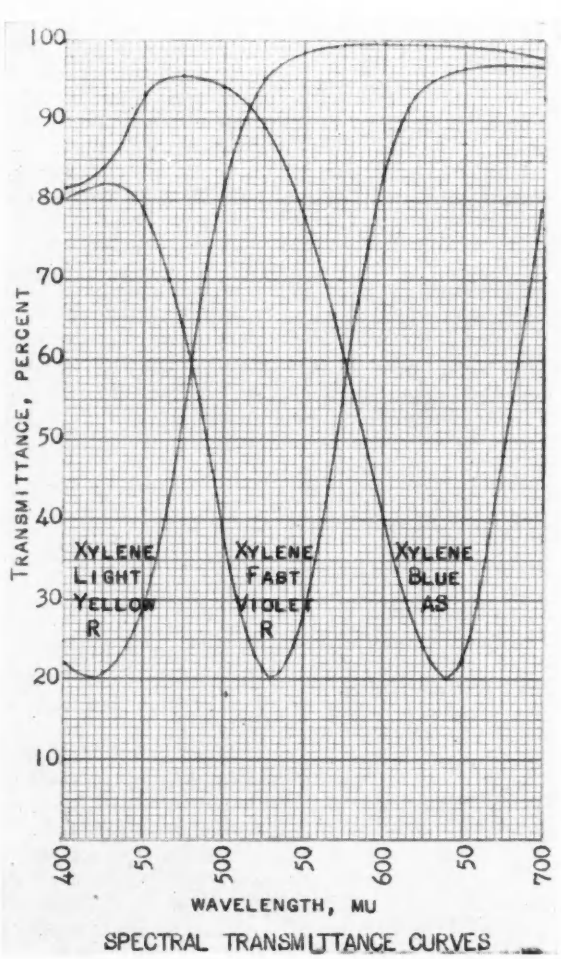


Fig. 2

* Synopsis of a paper presented at meeting, New York Section, April 1, 1949.

that "we distinguish objects by virtue of the light which they reflect, for the eye in its normal capacity as an instrument of vision is sensitive only to light." To add emphasis to this most important fact, the neglect of which is the root of much confusion concerning color, the statement was made that we do not see material (i.e., non-luminous) objects by means of light, rather we see light by means of the characteristic reflective or transmissive properties of material objects.

"The important factors which enter into the process of vision are the source of light, the object being viewed, the eye of the observer, and the brain of the observer. Radiant energy from the light source illuminates the object and this illumination is reflected either unchanged or spectrally modified into the eye of the observer. Here it acts upon the retina in a manner which has not yet been completely explained, and from the eye the reaction is conveyed via the optic nerve to the brain where the sensation of sight or color is experienced."

Color was defined as a psychological sensation which exists only in the mind, the end product of the sense of vision just as the sensation of sound is the end product of the auditory sense. "It is between the eye where the light first acts upon the observer and the ultimate appearance of the sensation of color in the mind of the observer that most of the complexities of color perception have their origin . . ."

"The spectrophotometer eliminates these variables and distortions simply by eliminating the observer. But the sensation of color resides only in the observer, so this is eliminated at the same time. The spectrophotometer therefore does not measure color, it measures the outward stimulus—the spectral energy or light which evokes the sensation of color in the observer. This fact is implicit in the very name of the instrument, for the word 'spectrophotometer' means a 'measurer of spectral light' . . ."

There followed a discussion of light and some of its properties. Illustrations showing the electromagnetic spectrum (Fig. 3) with emphasis upon the position and magnitude of the visible fraction, the composite nature of white light (Fig. 4), the concept of wavelength, and a table (Fig. 5) showing the magnitude of the yardsticks—the millimicron and Angstrom unit—were

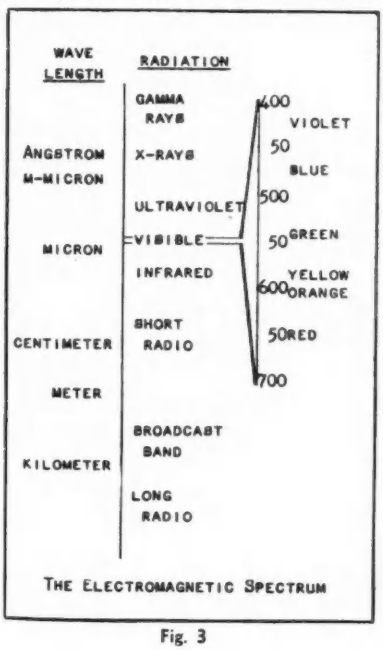


Fig. 3

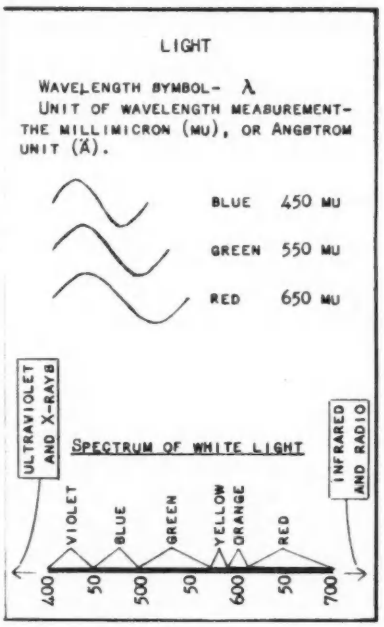


Fig. 4

projected upon the screen. The additive primaries—blue, green, and red were shown to have their origins in the abridgement or simplification of the spectrum of white light. The composite nature of white light was then demonstrated by dispersing the light of a projector lamp through a glass prism and then reuniting the spectral components into white light with the aid of a converging lens.

By means of slides the principle of selective absorption was next illustrated. A surface was shown (Fig. 6) to appear white in white light when all three additive primaries are reflected equally. When the blue component of white light is absorbed by the surface and the green and red components reflected, the surface appears yellow; it appears a magenta shade when the green alone is absorbed and the

TABLE OF LINEAR UNITS

1 METER = 1000 MILLIMETERS (MM)
1 MM = 1000 MICRONS (U)
1 U = 1000 MILLIMICRONS (MU)
1 MU = 10 ANGSTROM UNITS (A)

DISTRIBUTION OF LIGHT IN SPECTRUM

DESIGNATION	WAVELENGTH
VIOLET- SHORTER THAN	450 MU
BLUE	450-500 "
GREEN	500-570 "
YELLOW	570-590 "
ORANGE	590-610 "
RED- LONGER THAN	610 "

Fig. 5

red and blue components reflected; it appears bluegreen when the red is absorbed and the blue and green components are reflected. Surfaces which thus absorb or subtract one of the additive primary components of white light and so appear respectively yellow, magenta, or bluegreen are called the subtractive primaries. The same principle of absorption was shown with respect to light which is transmitted through transparent substances (Fig. 7).

The function of dyestuffs and other coloring materials was shown to be one of

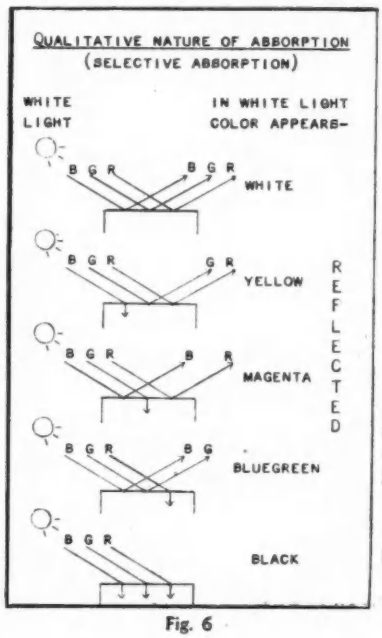


Fig. 6

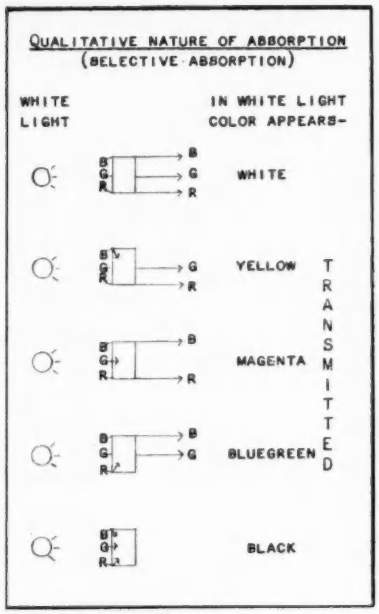


Fig. 7

absorption of spectral energy at one or more regions of the visible spectrum. The color stimulus originates in the illuminant, the particular color sensation imparted by a surface depending upon the amount and spectral composition of the light which the surface reflects. The spectral distribution of energy in the illuminant is therefore a vital factor in the visual appraisal of color. The more dye applied to a fabric the less becomes the reflectance, and if the three subtractive primaries are mixed and applied in sufficient concentration all of the illumination becomes largely suppressed causing the surface to appear grey, dark, or even black, i.e., a condition is approached equivalent to a complete absence of illumination. Contrary then to the over-simplified conception that color and dye are one and the same, it follows that the more dye which is put upon a fabric the less becomes the amount of color seen.

A twenty-minute period of demonstration followed this illustrated description of the physical theory of color in which the principles brought forth were subjected to test in the following manner—

1—A spectrum of white light was projected upon white and dyed samples of fabric, the components absorbed and reflected being seen separately in space.

2—Transparent slides similarly dyed were placed in the path of the spectrum, the transmitted components being shown reflected from a white surface.

3—By simulating the additive primaries with colored lamps in a diffusion chamber it was shown that the three together produced the sensation of white, and that the subtraction of any one component evoked the same color sensation as the dyed fabric or transparent slide which absorbed that component.

4—By illuminating the dyed fabrics in the light which they absorbed, each appeared practically black.

5—The natural relation between the additive and the subtractive primaries was illustrated by means of colored shadows.

The Spectrophotometer

The similarity between the demonstrations supporting the color theory and the functioning of the spectrophotometer was pointed out. The instrument, whether it be of the reflectance or transmittance type

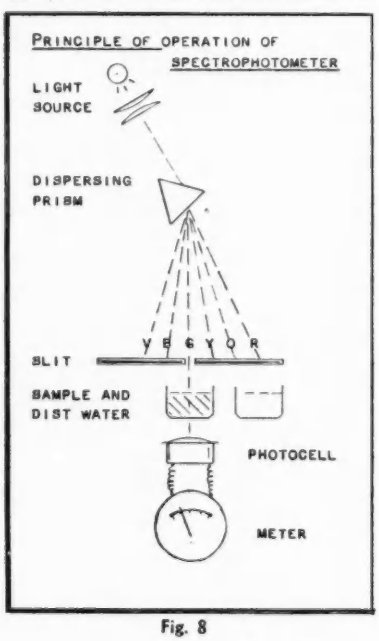


Fig. 8

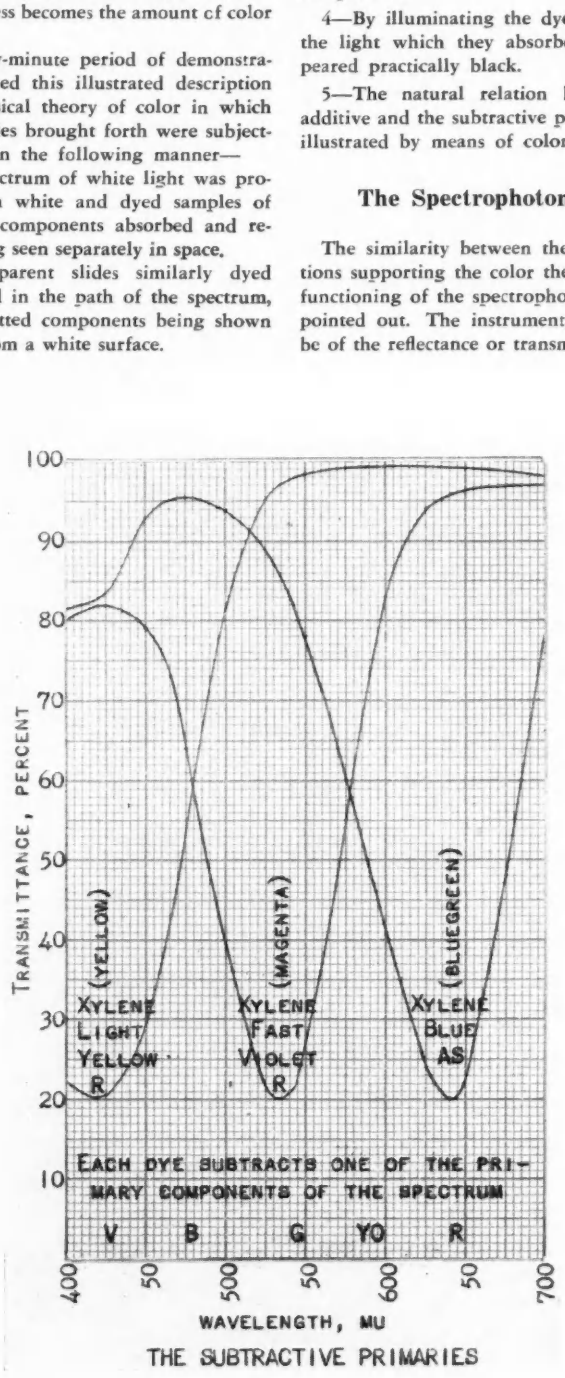


Fig. 9

"shows not merely what part of the spectrum is absorbed, it tells in terms of percentage exactly how much is absorbed at every wavelength throughout the spectral range." An illustration of the principle of construction of the instrument was shown on the screen (Fig. 8) together with a discussion of the technique of operation.

A graph illustrating the transmittance curves of the subtractive primaries (Fig. 9) showed the yellow 'Xylene Light Yellow R' to absorb in the blue-violet end of the spectrum, the magenta shade 'Xylene Fast Violet R' to absorb in the green at 530 millimicrons, and the blue-green 'Xylene Blue AS' to absorb to a maximum in the red at 640 millimicrons. The fact was pointed out that dyestuffs do not absorb completely at one region and not at all in another, rather they absorb to a greater extent at one region than at another. By means of superimposed films dyed with the subtractive primaries magenta, yellow, and blue-green, the resultant combination hues were shown to be red, green, and blue,—thus refuting the popular belief that red and blue are subtractive primaries.

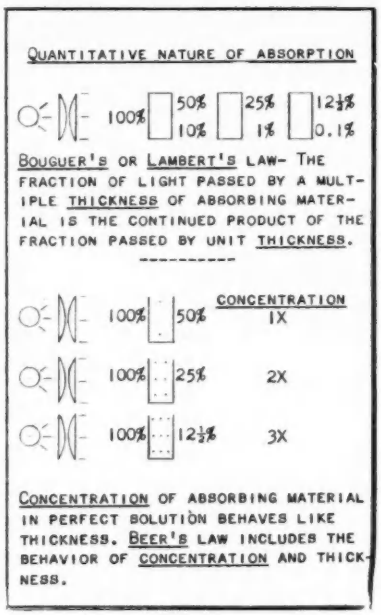

QUANTITATIVE NATURE OF ABSORPTION
100%
50%
10%
25%
1%
12½%
0.1%
BOUGUER'S OR LAMBERT'S LAW- THE FRACTION OF LIGHT PASSED BY A MULTIPLE THICKNESS OF ABSORBING MATERIAL IS THE CONTINUED PRODUCT OF THE FRACTION PASSED BY UNIT THICKNESS.
CONCENTRATION
1X
2X
3X
CONCENTRATION OF ABSORBING MATERIAL IN PERFECT SOLUTION BEHAVES LIKE THICKNESS. BEER'S LAW INCLUDES THE BEHAVIOR OF CONCENTRATION AND THICKNESS.

Fig. 10

The mathematical relation between transmittance and thickness of section and between transmittance and concentration was illustrated on a slide showing the essence of the laws of Bouguer and Beer, respectively, (Fig. 10). That Beer's law is only approximated in practice was shown on a slide containing curves of the same dye solution at several concentrations (Fig. 11). The spectrophotometric interpretation of fading was discussed at this point.

The manner in which some of the characteristics of dyestuffs may be catalogued by means of spectrophotometric curves was illustrated (Fig. 12), and the superiority of the instrument in the determination of small strength differences was commented upon.

The curve of a mixture of two dyes in the same solution was shown to be the

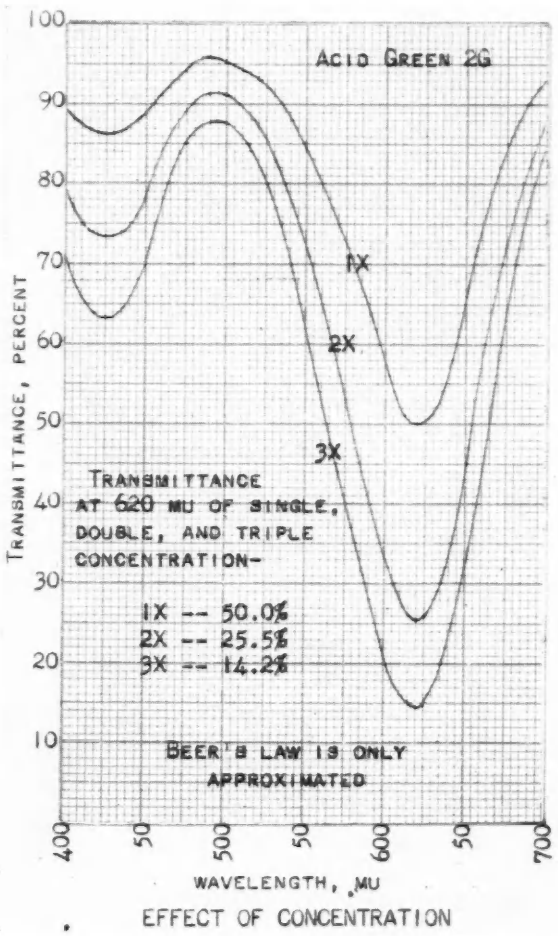


Fig. 11

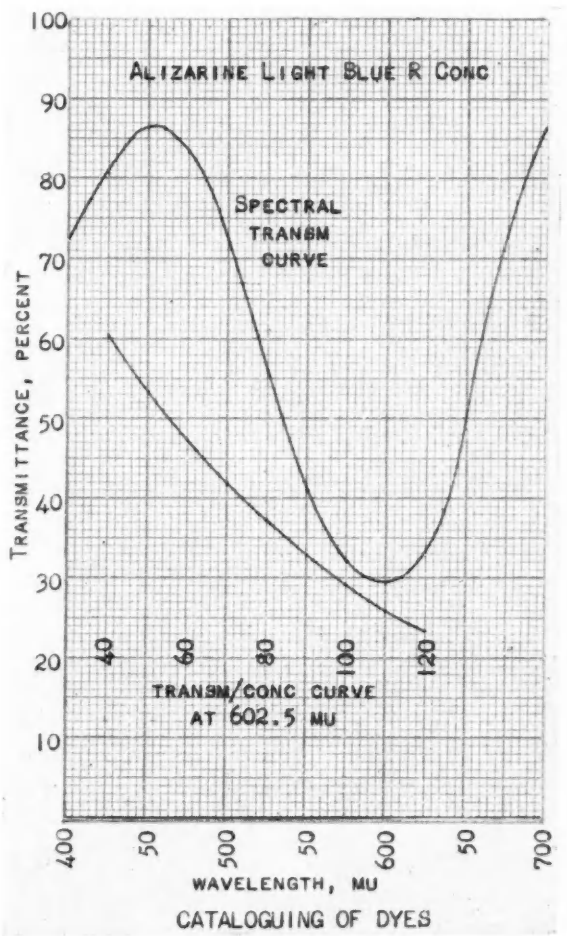


Fig. 12

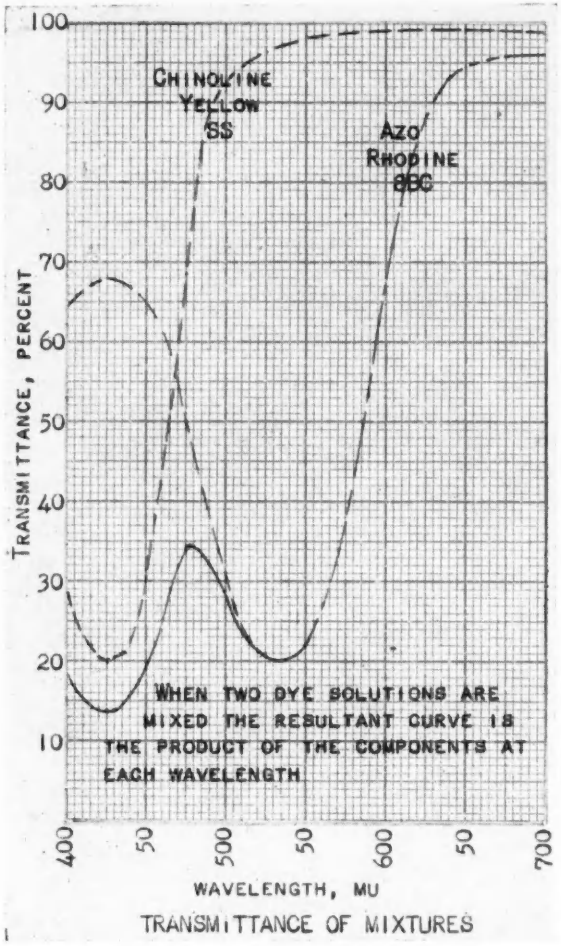

CHINOLINE YELLOW SS
AZO RHODINE 8BC
WHEN TWO DYE SOLUTIONS ARE MIXED THE RESULTANT CURVE IS THE PRODUCT OF THE COMPONENTS AT EACH WAVELENGTH
TRANSMITTANCE, PERCENT
WAVELENGTH, MU
TRANSMITTANCE OF MIXTURES

Fig. 13

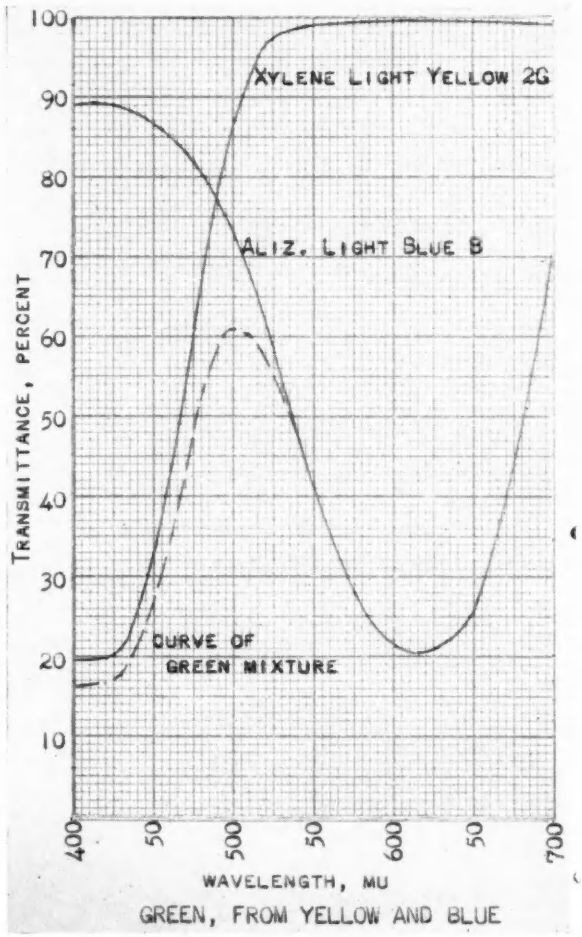


Fig. 14

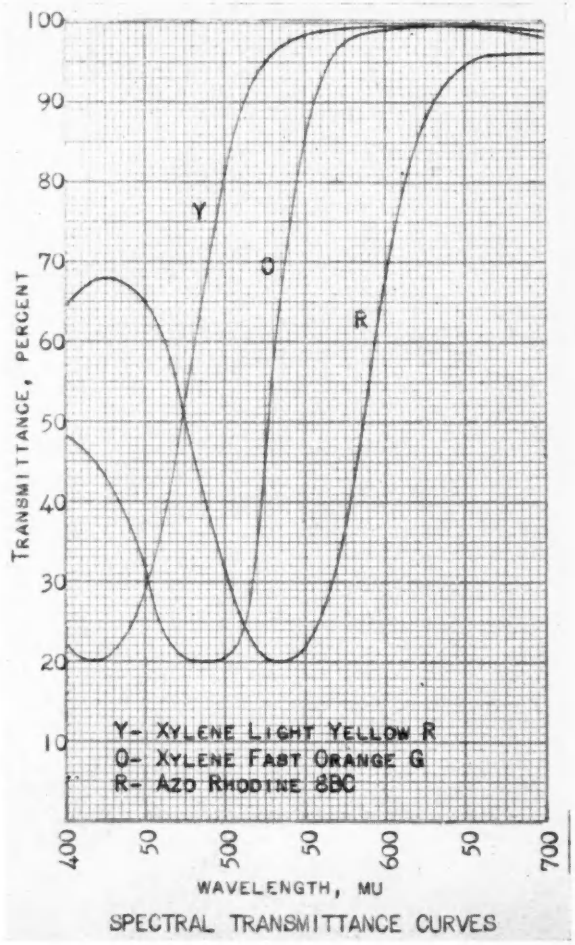


Fig. 15

product of the curves of the components. In this illustration (Fig. 13) Chinoline Yellow SS was mixed with Azo Rhodine 8BC, a combination which brought out very effectively the advantages of interpreting the behavior of dyes in spectrophotometric terms. Also evident in this illustration was the reason why violets and purples undergo such a marked change in appearance when viewed in artificial light. The mechanics of the production of green (Fig. 14) from blue and yellow was discussed.

The illustrative element of the lecture was concluded with the showing, as a matter of general interest, of the spectral transmittance curves of the following dyestuffs: Xylene Light Yellow R, Xylene Fast Orange G, Azo Rhodine 8BC, (Fig. 15); Acid Violet 4BNS, Xylene Brilliant Cyanine G, Xylene Milling Green B, (Fig. 16); Alizarine Light Brown BL, Alizarine Light Grey G, and Viscolan Black B, (Fig. 17).

In conclusion, the advantages and limitations of present day instrumentation were discussed, and the hope expressed that the general adoption of objective instrumental means of color appraisal as a substitute for intuitive judgment may lead to a healthy advance not only in the technical aspect of the business of dyeing but in commercial relations as well.

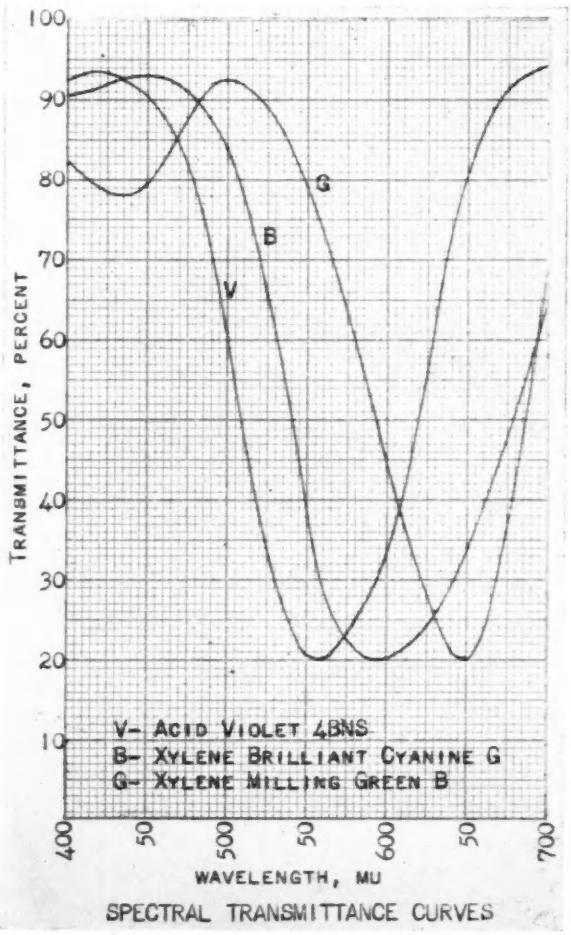


Fig. 16

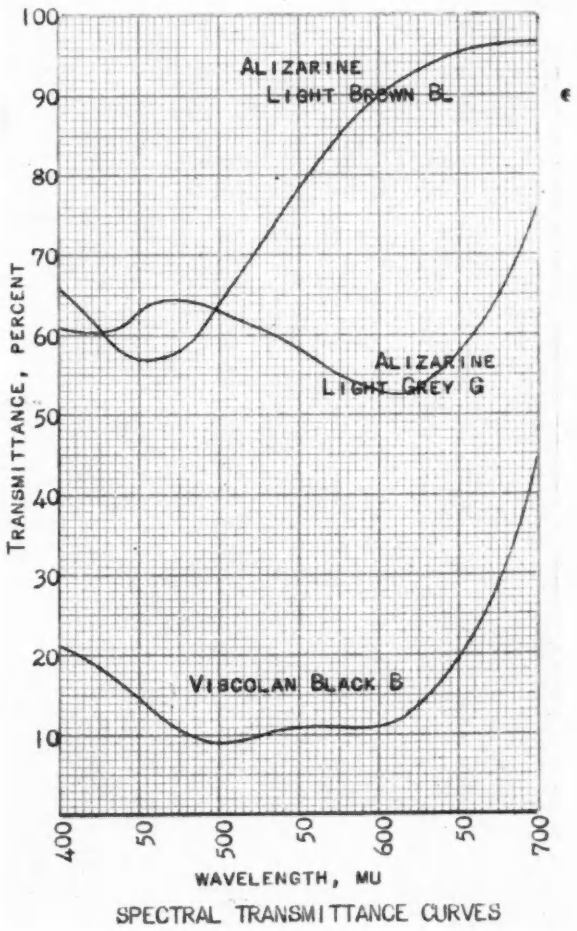


Fig. 17

R. George Hochschild Addressing Group at Joint Meeting of LTI Student Chapter and NNE Section

NNE Section Meets With Students at Lowell

THE annual meeting of the Northern New England Section with the Lowell Textile Institute Student Chapter was held on April 29 at the Institute.

The discussion, "Li[b]eralized Education versus Specialized Education" which was held before dinner, was well attended. Miss Ruth Denio, Richard Meltzer, and Walter Schwarz spoke on the liberal side; and Miss Dorothy McCarron, James Sweeney, and Remo Laureti on the specialized side. A brief but lively question period followed. All the speakers are members of the student body. Mr. Martin Lydon, assistant dean of the Institute, was the moderator.

After dinner, Lawrence Gardner, Chairman of the Student Chapter, introduced the speakers. George Hochschild presented a paper on "An Investigation of the Swelling Effects of Ammonium Thiocyanate on Textile Fibers". Lawrence F. McMahon presented a paper prepared by himself, Robert Pierent, and Robert Morrison on "An Investigation of the Effects of Phosphates on the Dyebath." A brief question period followed.

Approximately 130 attended the meeting; 33 from the Student Chapter.

Respectfully submitted,

JOAN GREGG,
Secretary.

Robert J. Pierent (right) Explains a Point

George Kenniston

Lawrence Gardner

Lawrence F. McMahon

Piedmont Section—

BLEACHING GOODS FOR DYEING AND FINISHING IN THE CONTINUOUS OPEN-WIDTH PEROXIDE SYSTEM*

J. L. MOORE

Electrochemicals Department, E. I. du Pont de Nemours & Company, Inc.

IT seems appropriate that we discuss continuous peroxide bleaching at this time because this year marks the tenth anniversary of the first successful commercial continuous bleaching installation. By the end of this year, approximately 60% of the cotton fabrics for which continuous bleaching is suitable will be handled by this process. In these ten years, the method of bleaching cotton has been revolutionized. The continuous peroxide bleaching process is filling the urgent demands for cheaper, faster, and better bleaching methods. The number of ranges in operation is indicative of the immediate success of the continuous peroxide system.

The rope system of continuous peroxide bleaching was developed first because the greatest proportion of cotton goods to be bleached could be handled in rope form. Other fabrics, because of weight and construction, could not be handled in rope form and had to be processed on jigs and similar equipment. It was for this class of goods that the open-width process development was undertaken.

Today there are three continuous systems for handling this type of cloth. One system has an enclosed stainless steel conveyor belt or belts and is known as the Mathieson Steamer (Mathieson Chemical Corp.) A second process, developed by the Buffalo Electro-Chemical Co., employs rope type J-Boxes with open-width saturators and washers. The third system, which is discussed in this paper, employs J-Boxes, saturators and washers in which the cloth is maintained in the open-width throughout the process. This is the Du Pont Open-Width Process.

The development of this open-width system was spurred by the Government's staggering wartime requirements for dyed heavy fabrics, including herringbone twill, 8-oz. suiting, wind-resistant poplin and tent twill. At that time Dan River Mills were producing large quantities of such fabrics. Dan River Mills and the Du Pont Company established a co-operative program for developing the continuous open-width peroxide bleaching process. The unit was designed and put into operation in the Spring of 1943.

The steps of the open-width J-Box continuous process are essentially as follows:

Singe
Desize
Mercerize
Caustic Treatment
Wash
Peroxide Treatment
Wash
Dry
Dye and Finish as Required

Proper preparation of the fabric for dyeing and finishing is fully as important as the dyeing and finishing processes themselves. There are certain constructions which, for obvious reasons, require open-width processing. To insure good penetration, it is important that the cloth be freed of impurities and rendered as absorbent as possible. The whiteness of the goods is not always a true indication of the dyeability of the goods.

Desizing

For successful dyeing a good desizing treatment is essential. There are a number of satisfactory desizing agents which are commonly used; no change in the method of using these agents is required when the desizing operation is combined with the continuous bleaching process. Adequate washing, preferably with hot water, is required after desizing.

Mercerizing

In many plants the cloth is mercerized immediately after desizing. Mercerizing at this point is advantageous from a processing standpoint. Since the next step in the process is the caustic impregnation, it is not essential that the cloth be washed completely free from caustic after mercerizing. There are limitations, however, to the amount of caustic which can be left in the cloth. In practice up to 1% NaOH can be tolerated, provided that the goods are not allowed to become dry. Utilization of this residual caustic favors the economies of the first J-Box treatment.

With increasing customer demand for higher luster on mercerized goods, there is a trend toward mercerizing after either the caustic or peroxide step. To obtain maximum luster mercerizing should be done after the peroxide treatment. Mercerizing after the caustic step gives better results than grey mercerization, but it does not conveniently fit into the operation of the open-width process.

Caustic Saturation

In one of the common types of caustic saturator the cloth dips into the liquor from 6 to 8 times. A set of intermediate squeeze rolls is provided to assist the exchange of water in the goods for the caustic treating liquor.

The saturator should be designed so that it holds a minimum of 300-400 gallons of liquor at its operating level. Without the cushioning effect of an adequate liquor volume, it is difficult if not impossible to maintain the caustic concentration at the desired point. No great advantage is obtained by using excessively large liquor volumes in the saturator.

The concentration of the caustic in the saturator can be maintained either by feeding 50% caustic soda solution directly, or by feeding an 8-15% solution from a mixing tank. When the 50% solution is fed directly, it is usually necessary to feed water in addition to the caustic to maintain the operating level. When feeding dilute caustic solution from a mixing tank, a solution concentration which will maintain saturator level and concentration within the prescribed limits should be selected. The concentration of this solution is governed also by the moisture differential of the cloth as it enters and leaves the saturator.

* Presented at meeting, Piedmont Section, January 29, 1949.

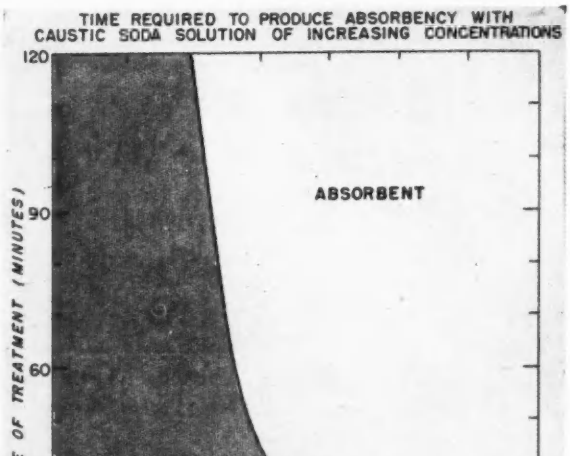


Figure 1

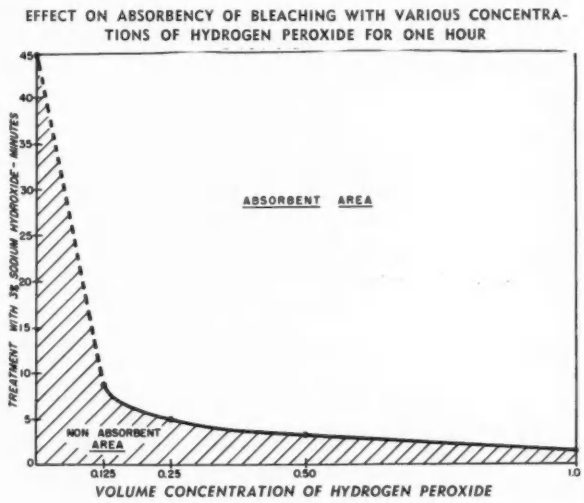


Figure 2

As the cloth leaves the saturator, it should contain 100-110% by weight of the caustic solution. If it contains too little solution, the effectiveness of the J-Box treatment will be reduced because there will be insufficient water present to permit the reactions to take place to full extent. The squeeze rolls should be adjusted to remove most of the water from the cloth before it enters the saturator. In practice, the goods usually contain no more than 85-90% by weight of water when entering the caustic solution.

It is necessary to maintain the concentration of the caustic within approximate limits of ± 5% in order to obtain consistent results. For instance, if the required NaOH concentration is 4%, it should be maintained between 3.8 and 4.2%. Simple titrations at 30-45 minute intervals will provide sufficient control of the caustic concentration.

When the caustic solution is fed from a mixing tank, rotameters may be used as indicating instruments to aid in maintaining a uniform rate of flow. It is desirable to supply the caustic solution to the rotameter from a constant head source. If the style of cloth or speed of operation is changed, it may be necessary to adjust the rate of flow from the rotameter in order to maintain the desired saturator concentration. When 50% caustic is fed directly to the saturator, proportioning pumps or rotameters may be used.

Considerable laboratory work has been done in studying the effect of various caustic concentrations in the first J-Box. Campbell gives data *(1)* on the effect of various caustic concentrations on the absorbency of 80 x 80 print cloth. The cloth was considered to have good absorbency if a drop of water placed on its surface was absorbed in 3 seconds or less.

It was shown that the time required to produce good absorbency varied from 15 minutes to more than 2 hours with 7% and 2% solutions, respectively.

The curves show that if the normal caustic concentrations of 3-4% are used, good absorbency is obtained in 50 minutes when operating at 212°F. It should be remembered that these absorbency data relate to cloth which was given only the caustic treatment. In processing heavier goods, higher caustic concentrations are required to give comparable absorbencies.

Figure 2 shows the effect of bleaching for one hour with peroxide, on the absorbency of cloth which was previously treated with 3% caustic for different periods of time at 212°F. Figure 1 shows that cloth treated for 15-30 minutes in 3% caustic, but without a bleaching treatment, is nonabsorbent. Figure 2 shows that this cloth becomes absorbent after treatment for 1 hour with peroxide baths as dilute as ⅛ volume. To produce comparable absorbencies in closer weaves and heavier constructions, higher concentrations of hydrogen peroxide are required than with the 80 x 80 print cloth used in these experiments. Absorbency is not the only criterion when determining whether goods are suitably prepared for dyeing. Mote removal is also a major factor and whiteness is particularly important when pastel shades are to be dyed.

Caustic soda is selectively absorbed from a caustic saturating bath by desized grey goods. For example, 100 lbs. of desized grey goods which are 100% saturated in 3% NaOH solution will actually drag out 4.5 lbs. of NaOH, if allowed to remain in contact with the saturating liquor long enough to reach equilibrium. About two minutes is required for desized grey goods to reach equilibrium with the saturating bath at room temperature. In the open-width process, the cloth is in the saturator for only 15-30 seconds, which is far short of the time required to reach equilibrium. This accounts for the fact that concentrations of 4-4½% are required in the caus-

tic saturator of the open-width process. Detailed description of the J-Box and its functions will be covered later in this discussion.

Washing

The washing of the goods after the caustic step must be conducted in such a manner that no appreciable amount of caustic is carried over into the peroxide saturator. Generally about 0.15-0.2% caustic, by weight of the goods, can be tolerated. If this limit is exceeded the pH of the peroxide solution is so increased that the peroxide becomes unstable on the cloth and the bleaching falls off. The efficiency of the washers is one of the chief factors which determine the speed of the range. Since the cloth cannot be processed faster than it can be washed, it is preferable to use warm or hot wash water in this step. Some of the coloring matter not carried away by cold water is removed by hot water. The flow of water required will depend on its temperature and the efficiency of the washer. By using hot water the peroxide consumption can be reduced. However, with increasing steam costs, the economics of the process may be improved by increasing the peroxide consumption somewhat and reducing the temperature of the wash water.

Peroxide Saturator

After washing, the goods pass into the peroxide saturator where they are impregnated with the bleaching liquor. There is no appreciable selective absorption of peroxide by cotton, so the time of saturation is not a major factor. The peroxide bath contains silicate and hydrogen peroxide and, for reasons which will be discussed later, the addition of small amounts of caustic is sometimes desirable.

The hydrogen peroxide concentration varies from ½-1½% of 35% hydrogen peroxide. The required concentration depends on cloth construction, weight of fabric and quality of the cotton used in its manufacture. Generally the more tightly constructed goods are more difficult to bleach and, consequently, require higher peroxide concentrations.

Sodium silicate plays a multiple role in peroxide treating liquors. It fixes pH values in the range of effective bleaching; it is the only alkali which gives good peroxide stability in the alkaline pH range required for efficient cotton bleaching. The stabilizing effect of sodium silicate is partially due to its deactivating effect on catalytic materials present in plant waters, cloth, etc.

In spite of the fact that the goods have been treated with caustic in the first step, materials remain which are capable of consuming alkali under the process conditions. To satisfy this alkali demand, a small amount of caustic is added to the peroxide-silicate bath. If this caustic addition is not made, the alkali is taken from the sodium silicate; the sodium silicate then tends to break down, forming undesirable silicious residues. These residues can hamper cloth sliding, by making the smooth sliding surface of the J-Box quite rough. The alkali content of the peroxide liquor should be adjusted so that 60-80% of the total is supplied by silicate, and the other 20-40% is supplied by NaOH. The liquor usually contains an alkali concentration equivalent to 12-18 lbs. of sodium silicate per 100 gallons, and has a pH value of 10.7-10.9. A silicate having an approximate ratio of 2.5 SiO_2 to 1 Na_2O, and a density of about 42° Bé, is customarily used in this process. It is possible that a silicate having a higher Na_2O ratio will accomplish the same result without the addition of caustic.

Peroxide J-Box

The peroxide J-Box is identical with the caustic J-Box in design. It should provide sufficient capacity to store the cloth for one hour at the proper operating temperature. To prevent reversion of color it is necessary that the goods come out of the J-Box containing some residual peroxide.

For consistently good results, it is necessary that properly conditioned steam be used in the J-Boxes. The steam must be expanded to essentially atmospheric pressure as it enters the heater tube. This is accomplished by expanding it into a large-diameter line, usually 4" or larger, immediately ahead of the steam distributor.

Figure 3 shows that a steam distributor is located at the top of the cloth heater tube where it is joined to the J-Box. This insures even distribution of the steam and uniform heating of the cloth. It is provided with plates with 5/16" perforations; the total area of the perforations is twice that of the steam pipe connected to the distributor. As would be expected, J-box steam requirements increase with increased J-Box capacity (lbs. of cloth per hr.). Corresponding increases in the available steam supply and perforated area must be made.

If the steam contains any appreciable superheat, it should be removed by spraying water from a properly designed and controlled atomizing nozzle. This desuperheating is best carried out after the steam has been partially expanded. A steam-water separator should be installed just ahead of the steam distributor. If superheated steam is allowed to enter

(*Concluded on Page P504*)

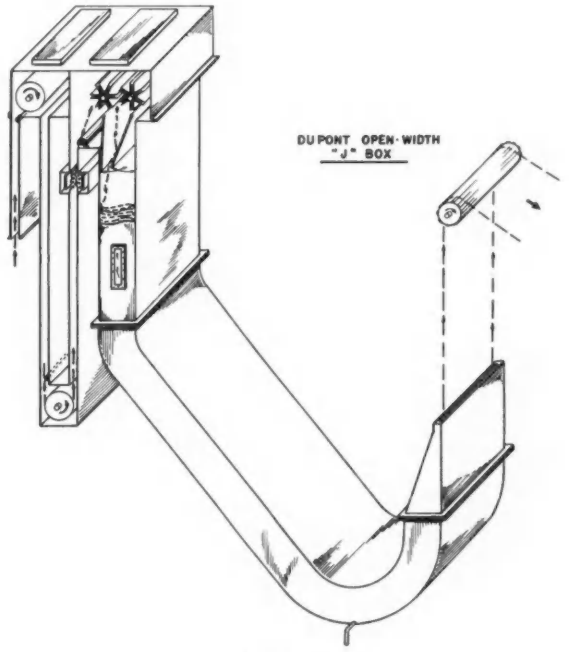


Figure 3

Rhode Island Section—

SEQUESTERING AGENTS: THEIR USE IN TEXTILE PROCESSING*

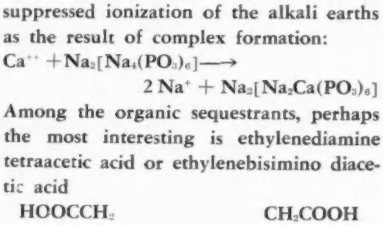
H. W. ZUSSMAN
Alrose Chemical Company

SEQUESTERING agents are water-soluble ion exchangers; they have the ability to deionize or deactivate heavy metal and alkali earth ions without actually removing them from solution.

Compounds of this type have long been known to the textile industry *(5, 9, 13, 24)* and include such varied products as the polyphosphates, iminophosphates, hydroxypolycarboxylic acids and aminopolycarboxylic acids. The polyphosphates, for example, have been widely used as water-softening agents; in the presence of adequate quantities of these materials, soap will not be precipitated by calcium and magnesium to which it is particularly sensitive. This is presumed to be due to the suppressed ionization of the alkali earths as the result of complex formation:

$$Ca^{++} + Na_2[Na_4(PO_3)_6] \longrightarrow 2\,Na^+ + Na_2[Na_2Ca(PO_3)_6]$$

Among the organic sequestrants, perhaps the most interesting is ethylenediamine tetraacetic acid or ethylenebisimino diacetic acid



first described in the chemical literature as Trilon B, a 45% active tetra sodium salt, manufactured by the I. G. Farben primarily for textile use *(1, 2, 3, 10, 13)*. Available in this country in limited quantities only until after the recent war, the development of several new applications for ethylenediamine tetraacetic acid *(35, 36)* have made possible the large scale production of this material domestically.† A re-examination of the compound's properties and its significance to the textile chemist is therefore timely.

Ethylenediamine tetraacetic acid is a white crystalline compound, decomposing at 220-240°C. It is insoluble in cold or hot water and in the common organic solvents; it is soluble in formamide from which it may be precipitated by diluting with water. It is soluble in strong mineral acids, forming amine salts, while on neutralization of the carboxylic acid groups with alkali hydroxides or amine bases, it forms a series of water-soluble salts. While the free acid is only 0.1% soluble in water, the disodium salt has a solubility of about 8% (pH 5.0) and the tetra sodium salt (pH 10.5), about 35%. None of these salts is soluble in organic solvents, but where solvent soluble derivatives are desired, these may be prepared by neutralizing with high molecular weight amines (dibutylamine, octylamine) or by esterification with alcohols.

If ethylenediamine tetraacetic acid (one mol) is neutralized with calcium carbonate (one mol) and sodium carbonate (one mol), a water soluble salt is obtained which does not respond to any of the analytical tests for calcium, such as precipitation with phosphate, oxalate, soap or carbonate; the calcium in this salt, therefore, does not exist in the ionized state. The tendency for calcium or other cations to be deionized by ethylenediamine tetraacetic acid may be expressed in terms of mass action laws, where the equilibrium constants (K_1 and K_2) represent the stability constants, using the nomenclature of Schwarzenbach *(27)*:

Schwarzenbach has determined K_1 and K_2 for several cations at 20°C. *(27)*:

	log K_1	*log* K_2
Magnesium	2.28	8.69
Calcium	3.51	10.59
Strontium	2.30	8.63
Barium	2.07	7.76

Ethylenediamine tetraacetic acid forms more stable complexes with the alkali earths at alkaline pHs than at neutral pHs; also, calcium forms more completely undissociated complexes than do the other alkali earth ions.

The formula for the Sequestrene-calcium complex (CaHY′ and CaY″) shows the calcium bonded by two ionic and two coordinate linkages. This type of compound has been termed a chelate complex. An alternate formula has recently been suggested by Schwarzenbach *(29)*.

In practical situations requiring the use of sequestrants, a competitive material is usually present. In a solution containing oxalate, Sequestrene and calcium, there are two competing reactions: precipitation of calcium oxalate and formation of soluble calcium complex. The tendency for one reaction to occur in preference to the other will depend on mass action considerations. While the solubility product of calcium oxalate is relatively constant over a wide pH range, the concentration

(a) Ca^{++} + [HY‴] ⟶ [CaHY′]

$$\text{and } K_1 = \frac{[CaHY']}{[Ca^{++}][HY'''']}$$

(b) Ca^{++} + [Y⁴⁻] ⟶ [CaY″]

$$\text{and } K_2 = \frac{[CaY'']}{[Ca^{++}][Y''''']}$$

* Presented before meeting, Rhode Island Section, January 28, 1949.

† Ethylenediamine tetraacetic acid and its salts described in this paper are the commercial products available under the trade name Sequestrene, manufactured by Alrose Chemical Company under U. S. Pats. 2,130,505 and 2,240,957: Sequestrene AA—technically pure acid; Sequestrene NA2—technically pure disodium dihydrate salt; Sequestrene A—27% aqueous solution of tetra sodium salt. In view of the unwieldy chemical names, the trade name Sequestrene will be used interchangeably.

of Y"" will decrease as the pH is lowered. Consequently, one might expect formation of soluble calcium to predominate at high pHs and formation of calcium oxalate to occur at low pHs. Figure 1 indicates how the calcium binding action of Sequestrene AA is affected by pH in a solution containing 0.08 mol Sequestrene and 0.15 mol sodium oxalate at 20°C., the presence of ionized caicium being readily detected by precipitation of calcium oxalate. Above pH 8.5 and in sodium hydroxide up to 15% concentration, Sequestrene will bind almost one equivalent of calcium ion; as the pH decreases, the ability of Sequestrene to bind calcium in the presence of oxalate decreases rapidly.

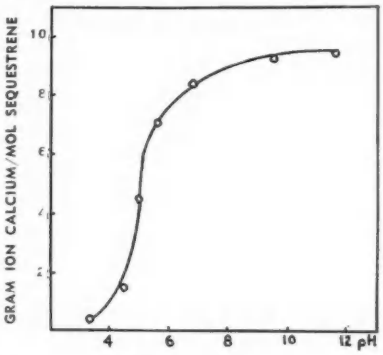


Figure 1

Sequestering activity also improves slightly with increase in temperature; at pH 10.5 and at 50°C., one mol Sequestrene binds one gram ion of calcium. In Sequestrene-oxalate-calcium systems at high dilutions, sequestering action appears enhanced due to retardation of precipitation of calcium oxalate—an effect analogous to, but not as strongly developed as, the "threshold" action of the higher polyphosphates.

The behavior of ethylenediamine tetraacetic acid with other divalent cations is essentially the same; the heavier the ion, the more efficient is Sequestrene as a deionizing agent. Thus, one mol (292 gms.) ethylenediamine tetraacetic acid will bind 24 grams of Mg^{++} and but 207 gms. Pb^{++} at alkaline pHs. In the case of iron, 1:1 complexes appear to be formed with either Fe^{+++} or Fe^{++}. The Sequestrene-ferric iron complex is more stable than the ferric ferrocyanide or ferric thiocyanate complexes above pH 1.5. Sequestrene will also prevent the precipitation of ferric hydroxide in ammonia or sodium carbonate solutions but not in dilute sodium hydroxide. Complexes of ethylenediamine tetraacetic acid with copper, nickel, cobalt, chromium, iron, aluminum, have been described by Brintzinger *(7, 8)*, Pfeiffer *(20, 21)* and Schwarzenbach *(27, 28, 29)*.

Aside from its chelating properties, Sequestrene possesses some other significant characteristics. Unlike the polyphosphates, Sequestrene is stable indefinitely in aqueous solution, undergoing no reversion or decomposition; it does not decompose on boiling, even in the presence of moderate concentrations of alkali. Sequestrene is not colloidal; unlike the polyphosphates, it is compatible with cationic agents such as quaternary ammonium compounds and does not precipitate proteins. Sequestrene does show some dispersing action on materials such as titanium oxide and manganese dioxide; it does not thin out clays or starches, however. Sequestrene is not surface-active in the generally accepted sense; it has no wetting, penetrating or detergent action itself. It will not, for example, dissolve stale lime soaps unless a wetting agent is present. It does, on the other hand, exhibit very interesting detergency building effects when used with soaps under certain conditions.

Brief mention might be made of other simple organic molecules with chelating properties. These would include oxalic acid, citric acid, tartaric acid, gluconic acid *(33)*, sorbitol and thioglycollic acid, all of which form iron complexes but relatively unstable calcium complexes; none of these materials is suitable for use as a water-softener. The derivatives of aminoacetic acid show an interesting evolution of sequestering power. Glycine, H_2NCH_2-$COOH_3$, forms complexes with copper but not with calcium; iminodiacetic acid, $HN(CH_2\text{-}COOH)_2$, forms complexes with copper and weak complexes with calcium; iminotriacetic acid, $N(CH_2COOH)_3$, possesses good calcium binding properties (but inferior generally to ethylenediamine tetraacetic acid).

The significance of sequestering agents to the textile chemist derives from the general problem of trace metal effects in chemical processing. The importance of these effects has not as yet been fully recognized.

Processing water is generally considered the most common source of difficulty in this respect. Although textile mills are usually located in soft water areas, the occurrence of iron in very small quantities is more widespread than commonly believed, varying from 0.3 to 5 p.p.m. with an occasional 10 p.p.m. in the dry season *(22)*. Even where the original metal content of the water may be negligible, iron, copper and other trace metals may be picked up from pipes, tanks, equipment accessories, overhead rust, from soil on workmen's hands, and so on. Water (particularly supplies with high bicarbonate content) drawn after weekend shutdowns will contain considerable quantities of rust.

Metal traces are often introduced along with chemicals. Some grades of anhydrous sodium sulfate and sulfuric acid will contain significant quantities of iron. Dyestuffs themselves occasionally contain metal impurities. Seibert *(31)* has analyzed several dyes for copper impurities. While the impurities are diluted in the dyebath, the concentration in some cases may still be sufficient to interfere with successful processing.

Another important source of trace metals, usually overlooked, is the textile fiber itself. Natural fibers, especially, contain metal and alkali earth ions as part of their normal makeup; hair fibers may actually serve as a means for excreting certain metals from the body. Wool, silk, cotton and rayon all contain chelating groups which actively retain metals throughout conventional processing. Proteins absorb cations strongly above the isoelectric point *(14)*; LaFleur *(16)* has recently investigated the adsorption of copper by wool. A recent study *(32)* traced difficulties in beam dyeing to the intrinsic iron, aluminum, magnesium and calcium content of the cotton cloth itself.

What are some of the effects of trace metals on textiles and how may sequestering agents be used to counteract these effects where they are undesirable?

I. Oxidations

Iron, copper and other metallic ions catalyze many types of degradation reactions, particularly oxidations. Cellulose fibers, rayon in particular, show a considerable loss in tensile strength on repeated launderings in the presence of atmospheric oxygen *(1,34)*; the addition of ethylenediamine tetraacetate to the wash bath has been reported *(1)* to retard tendering.

Copper and manganese are known to cause brittleness and deterioration of rubberized and certain resin finishes on textile fabrics; the addition of Sequestrene to the latex emulsion will in many cases nullify the adverse effects on the metals.

Oxidation, darkening and rancidity of many fat base finishes are accelerated by metals. The addition of 0.1% Sequestrene was found to maintain the peroxide value of a sample of commercial sulfonated tallow at zero over a thirty-day test period while a control sample had a peroxide value of 20 at the end of the test period.

Ethylenediamine tetraacetic acid has been reported to possess peroxide stabilizing properties *(23)*. Figure 2 illustrates the effect of Sequestrene on the stability of hydrogen peroxide solutions at 20°C. in the presence of sodium carbonate which normally catalyzes the breakdown of peroxide. Attempts to stabilize peroxide in the presence of sodium carbonate at high temperatures such as prevail in continuous bleaching have proven unsuccessful. Sequestrene does appear to have some merit in wool bleaching at acid pHs or

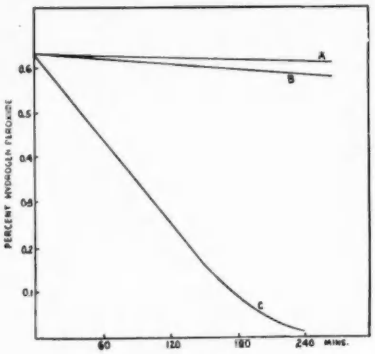


Figure 2

Effect of Sequestrene on Stability of Hydrogen Peroxide.
A. Aqueous peroxide, pH 7.
B. Aqueous peroxide +2% Na_2CO_3+0.2% Sequestrene.
C. Aqueous peroxide +2%Na_2CO_3.

in the presence of silicate at 50°C, superior whites being obtained. Table I summarizes a series of experiments, bleaching with sodium bisulfate at pH 3.5 - 4 at room temperature for five hours (500 cc. bath/10 g. wool flannel samples). Best bleachings were thus obtained in the presence of Sequestrene. It was noted, during the course of these experiments, that ferrous iron added to the bleach bath was strongly adsorbed by the wool unless Sequestrene was present. Later it was found that the wool flannel contained a very minute amount of iron originally, and that this could be removed rapidly only by washing with dilute hydrochloric acid; this iron could not be removed with oxalic acid or Sequestrene, although the latter neutralized the effect of the iron in the bleach (cf.A and C).

The possibility of using Sequestrene in retarding photochemical deterioration of fibers may be worth some consideration. Egerton has noted *(12)* that this deterioration is an oxidation process and is catalyzed by tin weighters in the case of silk and zinc oxide or titanium oxide in the case of nylon.

II. Detergency

The effects of alkali earths and metal ions on soaps and the use of the higher polyphosphates to counteract hardness are well known. It was assumed originally that noncolloidal Sequestrene could exert only a water-softening action in soap-hard water solutions. It was surprising to find that under certain conditions, the effect of Sequestrene was quite different. Figure 3 plots the percent soil removal (as calculated from reflectance data) of a 0.25% solution of a high titre neutral soap (A) and a 0.25% solution of the same soap containing 2% tetra sodium ethylenediamine tetraacetate (B) at 20°C in water of varying degrees of hardness, the pH being maintained relatively constant at 9.8. The cloth used was cotton muslin soiled with an emulsion of colloidal graphite and mineral oil. The soap containing Sequestrene (B) is as effective in water of 200 p.p.m. calcium carbonate as the pure soap (A) is in distilled water. At 200 p.p.m. calcium carbonate hardness, however, the amount of Sequestrene in the bath is only *one-thirtieth* of that theoretically required to deionize the calcium present. This effect is believed to be due to the solvent action of Sequestrene on the soap micelles, releasing inactive soap for cleaning purposes; the building effect of Sequestrene on soap detergency is depressed as the temperature of the washing bath is increased, but is still significant at 40°C. *(37)*.

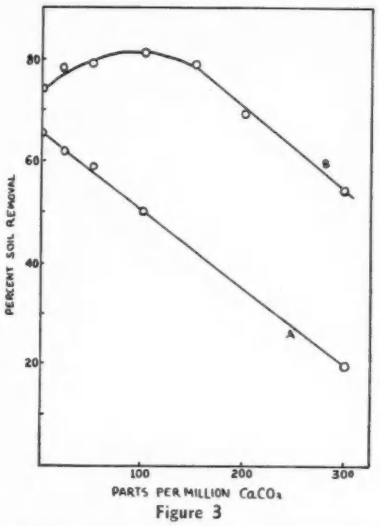


Figure 3

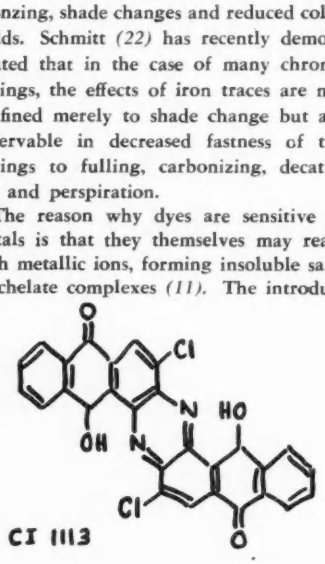
Table I

	A	B	C	D
130 vol. H_2O_2 gms.	4.0	4.0	4.0	4.0
$NaHSO_4$ gms.	0.8	0.8	0.8	0.8
Sequestrene NA2 gms.			0.3	0.3
Fe^{++} mgms.		5		5
Ca^{++} mgms.		5		5
Wool Reflectance	65.5%	55.5%	71.1%	70.4%

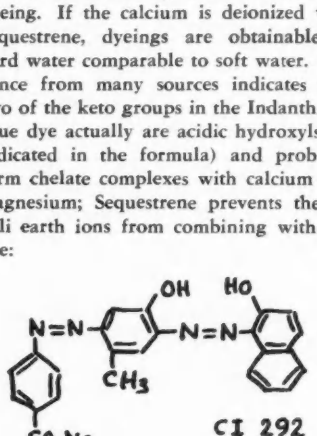
III. Dyeing

The effects of trace metals on dyeings have been well documented and need little elaboration. Trace metals are in many cases responsible for spotting, crocking, bronzing, shade changes and reduced color yields. Schmitt *(22)* has recently demonstrated that in the case of many chrome dyeings, the effects of iron traces are not confined merely to shade change but are observable in decreased fastness of the dyeings to fulling, carbonizing, decatizing and perspiration.

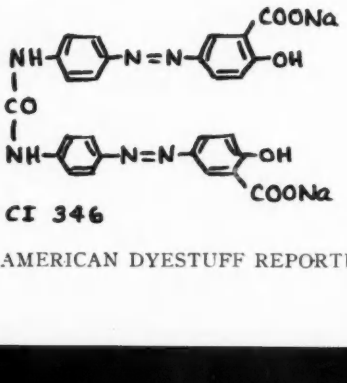
The reason why dyes are sensitive to metals is that they themselves may react with metallic ions, forming insoluble salts or chelate complexes *(11)*. The introduction of a metal into a dye affects the electronic configuration of the dye molecule, causing shade change or intensity change. Indanthrene Blue GCD (C.I. 1113) applied to cotton from hard water (150 p.p.m. $CaCO_3$) shows a 25% decrease in color yield as compared with soft water dyeing. If the calcium is deionized with Sequestrene, dyeings are obtainable in hard water comparable to soft water. Evidence from many sources indicates that two of the keto groups in the Indanthrene Blue dye actually are acidic hydroxyls (as indicated in the formula) and probably form chelate complexes with calcium and magnesium; Sequestrene prevents the alkali earth ions from combining with the dye:



CI 1113



CI 292



CI 346

[DYE-METAL] + SEQUESTRANT

⇅

[SEQUESTRANT-METAL] + DYE

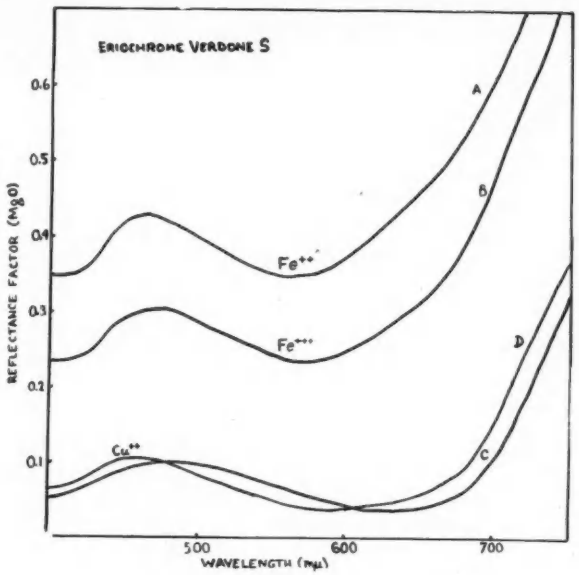


Figure 4

Reflectance Spectra of 1%.
Erichrome Verdone S Dyeings
A. In presence of 5 p.p.m. Fe^{++}
B. In presence of 5 p.p.m. Fe^{+++}
C. In presence of 5 p.p.m. Cu^{++}
D. Control

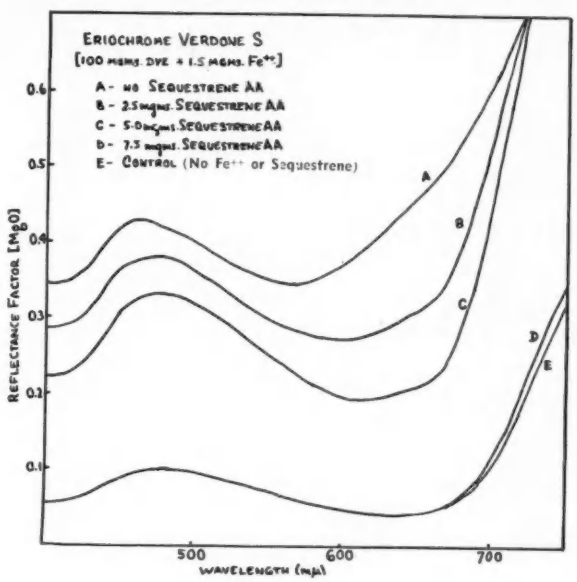


Figure 5

An example of a weak chelating dye is Benzo Fast Yellow (C.I. 346) containing two salicylic acid groupings. Dyeings made on cotton at pH 7 in the presence of 5 p.p.m. Fe++ are duller and browner. If an iron sequestrant such as citrate, polyphosphate or Sequestrene is added to the dyebath, a bright yellow dyeing is obtained. Any of these sequestrants has more affinity for the iron than the dye has, and may be used as corrective agent.

It might be expected that some dyes will have more affinity for the metal than the sequestering agent; in such an event, the sequestrant would be ineffective as a color corrective. An example of a very powerful chelating dye of this type is Eriochrome Verdone S (C.I. 292) containing as a complexing center the highly sensitive o, o'-dihydroxy azo grouping. This dye has been the subject of several studies in recent years *(5,6)*.

A series of dyeings were made with this color, using the following formula:

10 gms. Wool flannel
100 mgms. Eriochrome Verdone S
500 mgms. Sodium sulfate
100 mgms. Acetic acid
in 300 cc. Water

Dyeings were started at 60°C., raised almost to the boil and run to exhaustion, then afterchromed with 100 mgms. sodium dichromate. Providence tap water was used in all cases (iron content negligible); the pH of the prechrome bath, unless otherwise noted, was kept at 5.0. The normal dyeing obtained is green, the reflectance spectrum of the dyed fabric being indicated by C in Figure 4, with a maximum at 478 mu and a minimum at 630 mu. If trace quantities (5 p.p.m.) of Cu^{++}, Fe^{++} or Fe^{+++} are added to the prechrome bath, shade changes on the fabric become noticeable within a minute and the final dyeings are considerably altered; reflectance spectra of dyeings made in the presence of these ions are also indicated in Figure 4. The molar concentration of Eriochrome Verdone S in the dyebath is approximately 0.0001; 5 p.p.m. of the metal in the dyebath is equivalent to 0.000027 molar for the iron and 0.000023 molar for copper. If it is assumed that the dye forms a 2:1 complex with the metal, then it is evident that more than 10% of the dye is rendered unavailable for chroming. It is also evident that the effects of the trace metals will be more serious with pastel shades than with heavy shades. Of the two forms of iron tested, ferrous iron has a more pronounced effect on the shade of Eriochrome Verdone S and is also of more practical importance as iron dissolves in the reduced state and is usually found in this state in the water supply.

A series of dyeings were made in the presence of 5 p.p.m. Fe^{++}, varying quantities of Sequestrene being added to determine the minimum amount of sequestrant required to neutralize the iron. The results are expressed in Figure 5: 0.00075 gm. Sequestrene AA (0.0000265 mol) is adequate to neutralize 0.0015 gm. (0.000027 mol) Fe^{++}.

Another series of dyeings was made with 5 p.p.m. Fe^{++} with the addition of various chelating agents: oxalic acid, gluconic acid, citric acid, pyrophosphate, hexametaphosphate, and tetraphosphate. None of these reagents corrected the shade change induced by Fe^{++} even in quantities up to 100 mgms. per 1.5 mgm. Fe^{++}. Experiments with nails as the source of iron, to eliminate anticorrosion factors, confirmed these results. Sequestrene was thus the only chelating agent which formed an iron complex more stable than the iron-Eriochrome Verdone S complex.

The possibility that Sequestrene might produce some undesirable side reactions was then investigated: (a) *Effect on chroming:* The addition of 250 mgms. Sequestrene AA to the dyebath (three times more than theoretically required to combine with the available chromium) in no way affected the dyeing. With some other chrome dyes, it was found that boiling with an alkaline solution of Sequestrene resulted in stripping of chrome, converting the shade to the prechrome color. (b) *Effect of low pH:* The addition of Sequestrene AA to dyebaths containing sulfuric acid instead of acetic acid and at pH 1.5 proved adequate for neutralizing the effect of Fe^{++} on the shade. (c) *Correction of dyeing faults:* Dyeings were made with 5 p.p.m. Fe^{++} in the bath, Sequestrene being added only five minutes before the chrome; the iron was stripped from the

wool and a normal dyeing obtained.

In the case of dyeings made with copper, the polyphosphates were again found inadequate as correctives. On the other hand, Sequestrene was not as efficient in preventing the reaction of the dye with copper as in the case of iron. Approximately 2.5 mols Sequestrene per gram ion copper had to be used to restore the normal green shade.

The o,o'-dihydroxy azo grouping of Eriochrome Verdone S is not sensitive to calcium or magnesium at acid pHs; at alkaline pHs, however, the o,o'-dihydroxy azo grouping is very sensitive to the alkali earths *(30)*. While this presents no problem in chrome dyeing, this sensitivity would be serious in diazotizing and alkaline coupling reactions.

These are some typical applications for sequestering agents in textile processing. Obviously, weak sequestrants are suitable for use in many cases, while in other situations only very powerful chelating agents like Sequestrene will be adequate. It might also be noted that trace metals are not always the villain: alpha-amylase used for desizing is catalyzed by calcium ion. The use of Sequestrene in a desizing bath might therefore be detrimental.

Acknowledgment

The author acknowledges gratefully the help and advice of Albert Darbey in obtaining data on textile applications, particularly on oxidation of sulfonated tallow and on peroxide bleaching.

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Bleaching—

(*Concluded from Page P499*)

the heater tube it will have an undesirable drying effect on the cloth. The reaction rates are retarded by excessive drying of the cloth and, if drying goes to completion, the desired reactions completely stop.

If exhaust steam or wet steam is used, a water-steam separator of sufficient capacity is necessary. If wet steam is used without removing excess water, dilution of chemicals on the cloth will reduce the effectiveness of the treatment.

The steam flow to the heater tube is controlled automatically. In addition to the control instrument, a cloth temperature indicator or recorder is usually employed.

Washing

The washing requirements following the peroxide step are important but not nearly as severe as those following the caustic step. Warm or hot water is desirable and often necessary.

Single-Stage Process

Some plants have production requirements which necessitate open-width processing but not enough volume to justify a large two stage installation. In these cases, a single stage open-width range is most suitable. In operating a single stage range, the J-Box is used for alternate caustic and peroxide treatments. To facilitate the change from caustic to peroxide treating liquors in the saturator, small holding tanks are used. This eliminates loss of chemicals when the change-over is made.

Summary

Continuous open-width bleaching has a definite field in the preparation of heavy weight goods for dyeing. The open-width system must be used for fabrics which do not lend themselves to rope-form ranges. The continuous open-width peroxide bleaching process is most suitable for the types of goods now being processed in jigs and similar equipment.

The continuous open-width peroxide process offers a means of producing in volume, goods uniformly prepared for dyeing. The process should be tailored to meet the production requirements of the individual plant. These requirements determine the size of the storage units, the number of washing units and the speed of the range.

In preparing goods for dyeing the continuous open-width processes gives the uniformity of preparation which is essential to good dyeing. This uniformity is possible because the conditions influencing it are easily controlled. The conditions which must be maintained are: uniform saturation of the cloth with the treating baths maintained within the prescribed limits of concentration; uniform heating of the cloth for treatment during storage; and retention of the cloth in the storage chambers for the required periods of time. Other conditions which must be met are uniform washing and uniform drying of the cloth.

The continuous open-width process is being used to prepare a wide variety of fabrics for dyeing with vat dyestuffs. Dyeing of vat colors is being done by both the continuous and the pad-jig methods. Sulfur colors also are being satisfactorily applied to goods prepared by the open-width process. Finally, the process is being extensively used to produce full market whites on heavy fabrics.

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Research Highlights

ADVISORY COMMITTEE. — S. A. Simon of Chicopee Manufacturing Company is Chairman of the Sectional Advisory Research Committee, Western New England Section. The other two members of this committee are Dr. B. Lustig and Dr. Samuel Machlis.

COMMITTEE APPOINTMENT. — W. P. Utermohlen, Jr. of the Institute of Textile Technology has accepted appointment on the Cotton and Synthetic Fibers Group of the Detergency Research Committee of the A.A.T.C.C.

VISITORS AT LOWELL.—E. J. Tyrell, Head, Research Bureau, T. Eaton Company, Ltd. (Toronto, Canada) and N. S. Brook, Research Bureau, Branded Lines, of the same Company (Winnepeg, Canada) visited the A.A.T.C.C. Laboratory on May 17, 1949.

These gentlemen were interested in discussing test methods, procedures and specification with retail department stores, particularly in comparing requirements and specifications in this country and in Canada.

TRADE NOTES • NEW PRODUCTS

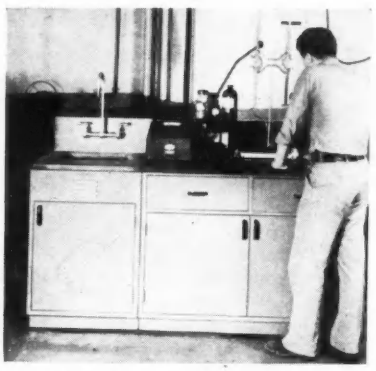
• New Versatility in Test Benches

Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa., announces test benches for use at test stations in textile plants which can be had in any length and in a variety of designs by joining prefabricated steel units recently developed and now available from stock.

Eighteen different all-steel units are available, including drawers, cupboards, sinks, tables, storage cases, etc. They are designed to be joined easily one to another to form test benches either 30" or 36" high. Units are two, three, four or five feet in length and make use of the newly developed plastic-impregnated stone called "Kemrock" for bench working surfaces. "Kemrock" is claimed to be tough, smooth, black and extremely resistant to ovens and chemically corrosive materials.

The new line, called "Unitized" test benches, is said to answer a need for heavy steel furniture upon which to run weighing, moisture, sizing, strength, or other tests at convenient in-the-plant areas.

An illustrated catalog giving full details, dimensions, and prices can be had from the manufacturer.

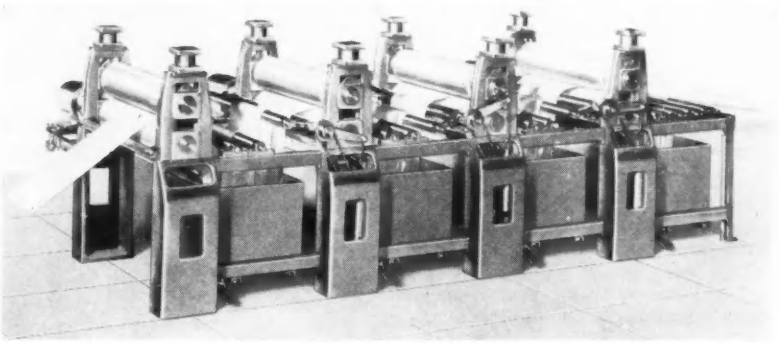


Fisher Test Bench—Front View

• New Butterworth Compartment Washer

A new compartment washer is being announced by H. W. Butterworth & Sons Company, Philadelphia. It is a unit construction machine and can be furnished in any multiples of compartments. This unit type construction is said to make the new washer one of the most flexible machines in operation. It can be used in range operation, synchronized with other finishing machinery, or can be operated independently on washing, processing or dyeing.

It is stated that the new machine is designed to operate faster than ordinary compartment washers, handling goods thoroughly and efficiently during washing operations. Different weights of cloth, it is claimed, can be run through the new Butterworth Washer without "scrimping in" or damaging the goods. Compensating rolls in each compartment have individual drives to control speed and tension during washing operations.



Butterworth Compartment Washer

Among the features claimed for the new Butterworth Compartment Washer, many of which are new, are: sturdy, streamlined Meehanite iron construction; adjustable controls for pressure at each nip; automatic pressure release; mechanism for holding squeeze rolls apart when machine is not operating; stainless steel liquor boxes; protected electrical equipment; and foot-operated valves for quick discharge of liquors.

• Landers Honored

Bernard L. Landers, Vice-President in charge of the Boston, Mass., office of Philipp Brothers Chemicals, Inc., was recently tendered a dinner and theatre party in honor and celebration of his 25 years of association with the organization. Attending the celebration were the executives of the combined offices of Philipp Brothers, Inc., and Philipp Brothers Chemicals, Inc. A graduate of M.I.T., Mr. Landers has been affiliated with various dye and chemical manufacturers, and at one time was connected with the National Aniline Company.

During the dinner ceremonies, Mr. Landers was presented with a large-screen television set and a suitably engraved silver plaque in remembrance of his long association with the Company, after which he was also notified of his election to the Board of Directors of the Company.

• Booklet on Higher Diols

Uses and properties of eight new glycols are described in a new eight page booklet, "Higher Diols" published by Carbide and Carbon Chemicals Corporation. Specific glycols described include butanediol-1,3; pentanediol-2,4; the two six-carbon diols, 2-methyl-pentanediol-2,4 and hexanediol-2,5; heptanediol 12,4; ethylhexanediol; and two interesting new substituted 1,5-pentanediols. This booklet gives complete physical properties for the higher diols, comparing them to the lower, more familiar 2- and 3-carbon glycols and glycerol. Uses have been tabulated by product and industry for quick reference. Copies of the booklet can be obtained from the company by requesting Form 6719.

In general, the diols are said to be colorless, stable, hygroscopic liquids of low volatility. These properties make them of particular interest for moistening and softening textile fibers. These diols are also said to have excellent solvent properties for dyes, printing inks, essential oils and various gums and resins. Except for ethylhexanediol and ethoxymethyl dimethyl pentanediol they are completely miscible with water and the lower alcohols. Unlike the lower oxyalkylene glycols, diols exhibit no regular relationship between molecular weight and boiling point or other physical properties.

It is said the new higher diols readily form diesters which are important as plasticizers, resins and emulsifying agents. A primary hydroxyl group usually is more reactive than a secondary. This difference in reactivity can be used to advantage for the preparation of mixed esters. Dehydration generally yields a diene but in some cases a single unsaturated linkage can be obtained.

• Textile School Staff Conference

The first textile school staff conference in the history of textile education in this country was held when the teaching members of the 12 United States textile schools gathered at the Lowell Textile Institute for a 3-day program, June 15-17, according to an announcement by President Kenneth R. Fox of the Institute, who sponsored the conference.

A group of over a hundred educators were present for a round table discussion of their mutual problems. The Lowell Textile Institute housed the guests in its new dormitory, Smith Hall, and provided a program of outstanding speakers in the field of textile education, as well as having arranged the panel discussions in the teaching of the different fields of textile technology.

The 12 schools which cooperated in the program were: Alabama Polytechnic Institute, Bradford Durfee Technical Institute, Clemson College Textile School, Georgia School of Technology, Institute of Textile Technology, Lowell Textile Institute, Massachusetts Institute of Technology, New Bedford Textile Institute, North Carolina State College, Philadelphia Textile Institute, Rhode Island School of Design, and Texas Technological College.

Mornings during the 3-day conference were given over to speakers and the afternoons devoted to panel discussions. Three panels were held each afternoon covering Textile Manufacturing, Textile Chemistry, and Design and Weaving.

The complete program was as follows:—

Wednesday, June 15

Welcome by President Kenneth R. Fox, Lowell Textile Institute.

"Specialized Curricula in the Textile Schools in Relation to Changing Management Responsibilities," Frederick M. Feiker, Dean, College of Engineering, George Washington University.

PANEL DISCUSSIONS:

Manufacturing Panel—Gilbert R. Merrill, Lowell Textile Institute, Leader.

"The Handling of Large Laboratory Classes in Applied Textile Courses."

Chemistry Panel — John H. Skinkle, Lowell Textile Institute, Leader.

"Prototype Apparatus and Methods."

Design and Weaving Panel—Vittoria Rosatto, Lowell Textile Institute, Leader.

"Types of Examinations, Methods of Grading, and Distribution of Staff in Lecture and Laboratory."

Thursday, June 16

"A Reaction to Textile School Education and the Problem of Placing Men in Supervisory Positions," Frank Maria, Department of Industrial Relations, Merrimack Manufacturing Company, Lowell, Massachusetts; James J. Gaffney, Department of Industrial Relations, Newmarket Manufacturing Company, Lowell, Massachusetts; Wallace McQuarrie, Department of Industrial Relations, Abbot Worsted Company, Forge Village, Massachusetts.

PANEL DISCUSSIONS:

Manufacturing Panel—Elliot B. Grover, School of Textiles, North Carolina State College, Leader.

"General Manufacturing Courses vs. Specialized Courses in a Major, i.e. Wool, Cotton, Synthetics."

Chemistry Panel — Harold Sturtevant, Rhode Island School of Design, Leader.

"How to Obtain Quantitative Laboratory Results in Dyeing and Finishing Laboratory Work."

Design and Weaving Panel — B. R. Koening, Philadelphia Textile Institute, Leader.

"How Successful Has Visual Education Been in Weaving Instructions."

Friday, June 17

"The Type of Training Prerequisite to Research and Graduate School Training and the Contribution of Textile Education at the Undergraduate Level," Professor Edward R. Schwarz, Massachusetts Institute of Technology.

PANEL DISCUSSIONS:

Manufacturing Panel — Thomas H. Gourley, New Bedford Textile Institute, Leader.

"Methods of Grading, Examination Techniques, Report Writing."

Chemistry Panel—P. Theel, Philadelphia Textile Institute, Leader.

"Basic vs. Applied Chemistry."

Design and Weaving Panel—John G. Stickler, Bradford Durfee Technical Institute, Leader.

"How to Offer Weaving Subjects, by Type of Motion, Type of Loom, or by Fiber Being Handled."

• LTI Graduation

The largest graduating class in the history of Lowell Textile Institute was awarded a total of 99 degrees by President Kenneth R. Fox at the 51st Commencement exercises, held at the Merrimack Square Theatre, Lowell, Massachusetts, on June 1.

Bachelor of Science degrees in Chemistry, Manufacturing and Engineering were awarded to 87 students, while six received Master of Science degrees in Textile Chemistry and six received their Master of Science degree in Textile Engineering. Seven foreign countries were represented among the graduates including India, China, Turkey, Brazil, Chile, Canada and Greece.

The Commencement address was given by Dr. Ralph A. Van Meter, President of the University of Massachusetts. Dr. Van Meter decried the current pessimism in economic and social affairs and pointed out the great avenues of progress that should beckon to the graduate. He said in part:

> "You should never feel for a moment that there is no important place in the world for you. The need for competent professional people was never greater. No generation ever had a better chance than yours to accomplish something sound and solid and lasting. The very uncertainty of these days is an indication of the many important problems to be solved and proof that civilization is not static but very much alive and undergoing vigorous development. It is in such situations that the competent individual finds the greatest opportunities for service. It is the shaking of the measure that brings the big grains to the top. The problems of the textile industry spell opportunity for you."

The Cotton Medal, awarded by the National Association of Cotton Manufacturers to the highest ranking student pursuing a course in Cotton Manufacturing was awarded to Russell Lee Brown, Jr. of Lowell by Charles H. Forsaith, Superintendent of the Cotton Division, Merrimack Manufacturing Company, who represented the Association.

Ather honors and awards were announced by Simon Williams, Dean of the Institute, as follows:

The New England Textile Foundation scholarship for one year of graduate study in textile technology at M.I.T. went to Phillip A. Gruber of Lowell, Massachusetts.

The Textron fellowship for one year of graduate study was awarded to Milton Charatz of Brooklyn, New York.

The Phi Psi award of a matched leather wallet and case went to Seymour Gottlieb of Brooklyn, New York.

Robert J. Peirent of Dracut won the senior prize in chemistry awarded by the American Association of Textile Chemists and Colorists consisting of technical books and a year's membership in the association.

The Louis A. Olney book prizes, awarded to top ranking chemistry students in undergraduate courses, were announced as follows: junior year, to Frederick M. Hornyak; sophomore year, first prize, to Robert M. Creegan; sophomore year, second prize, divided between Eric A. Schlaginhaufen and Edwin C. Sherburne; freshman year, first prize to Carl F. Pihl; freshman year, second prize to Haig C. Donoian.

• First Wet Processing Show

The first annual Wet Processing Exhibition held at the 71st Regiment Armory in New York, June 6-10, appears to have been met with various degrees of enthusiasms from both exhibitors and spectators. By and large, however, there was a good deal of satisfaction expressed. Several machinery companies were more than pleased by the response and interest of what one chooses to describe as "good quality surveyors." This category includes executives, purchasing agents, and important mill personnel. A representative of another large firm declared the show "an unqualified success" from his standpoint. As can be expected, many with only an indirect connection with the wet processing phase were frankly disappointed with the show. It can be said this applies to a few of the exhibitors as well.

The very nature of the show, that of specialization, as well as the fact that it was the initial venture of this type probably accounts for the rather small number of exhibitors in comparison with other trade expositions. The count was 31. Attendance ran about as expected, the figures totalling just under 2000 for the five days. It is pointed out, however, that the figures were exclusive in the sense that some groups such as students, certain sales personnel and those outside the trade were disregarded in the count. Monday and Friday were comparatively poor days numbering just over 200. A peak of 642 was registered on Thursday.

A large majority found the show very worthwhile and a large group of the exhibitors did not hesitate in stating they would exhibit again in the same type affair providing it doesn't conflict directly or indirectly with some major exhibition in which they ordinarily would participate.

It is still too early to judge the show from a sales stimulation view point, but a few exhibitors found it an ideal place to introduce or acquaint their products to the greatest potential customers. One or two of the non-machinery exhibitors expressed the opinion that "they could have done a great deal better from a sales standpoint in a couple of days on the road" but also expressed the value of keeping their product before the trade. There were numerous expressions of disappointment about the sparsity of chemical products exhibitors.

The large exhibit of the American Association of Textile Chemists and Colorists ranked with the leaders in spectator interest and number of visitors.

Arthur Tarshis, exposition manager for "Expositions for Trades"—sponsors of the show, announced he considered the show a large success and it will be held biennially. The next one is slated for June '51 and will be held either at the armory or Grand Central Palace.

• New Impregnation Machine Introduced

Stein, Hall & Co. presented the Stark Continuous Impregnation Process at the Wet Processing Exhibition earlier this month, the exhibit showing the impregnation of samples with barium chloride.

Excellent penetration is claimed due to the action of a liquid seal vacuum through which the fabric must pass before exposure to the penetrating liquid. Specific action takes place at the orifice of the vacuum change, the vacuum being approximately 25" Hg. Variable speeds, ranging as high as 1500 feet per minute for jute, are claimed. Other variables entering into the operation include viscosity, vacuum, and a series of web clearances.

General literature on the machine for the trade is promised for the near future by the company.

• Additional Exhibits at Show

Two exhibits at the 71st Regiment Armory (N. Y. C.) were not described in the Wet Processing Exhibition Number due to late decisions to enter.

The B. F. Perkins & Son, Inc. (Holyoke, Mass.) exhibit consisted primarily of two machines of English make, on exhibition for the first time in this country. Perkins now holds sole patents on both. One, the "Autojig" manufactured by F. Smith and Co., Ltd., Rockdale, boasts an entirely automatic dye jig drive with tensionless operation, constant speed, and automatic stop when the required number of passages are made. The other, a mist spray dampener devised by Hunt and Moscrop Ltd., features a spray formed by water pressure only, with gravity bringing the spray down in a cloud on both sides of the fabric. The latter machine was also of interest to those in the paper trades.

The Winsor and Jerauld Manufacturing Company, Inc., of Providence, R. I., distributed literature relative to their tenters, tenter clips, cloth guiders, batchers, and weft straighteners as well as having actually demonstrated the weft straightening and air guiding equipment. A very practical display, which utilized a machine to insert skew for demonstration purposes, showed the operation of the electronically controlled straightener in conjunction with their "dynamic braked" cloth guiders.

• New Headquarters, Monsanto Textile Department

The textile chemical department of the Merrimac Division of Monsanto Chemical Company is now headquartered with the division's executive offices and plant in Everett, Mass., John L. Gillis, Merrimac Acting general manager, has announced.

Other offices scheduled to move from the company's Boston location to Everett before July 1 include the division's advertising and export departments, and the New England Alcohol Company, a Monsanto subsidiary.

Branch sales offices of the textile chemical department in New York, Charlotte, N. C., and other cities are not affected by the change.

• NBTI Graduation

On June 3rd, the New Bedford Textile Institute graduated the largest class in the history of the institution. The 102 graduates were presented their certificates by Miss E. Ferris Almada, a trustee of the institute. More than half of this class was comprised of Chemistry, Dyeing and Finishing majors (36) and Textile Engineering majors (32) who received diplomas certifying their successful completion of highly technical courses.

The Fred E. Busby chemistry award went to J. Raymond Nisbet who graduated in chemistry and the medal of the National Association of Cotton Manufacturers went to Albert D. Kuehn who was graduated in textile engineering. The American Association of Textile Chemists and Colorists award for outstanding work in textile chemistry was presented to Samuel Helfand who was graduated in chemistry. Several undergraduate awards were also presented at the exercises.

The address to the graduating class was given by John J. Kelly, M.Ed., Ed.D., L.L.D., president of Bridgewater State Teachers College. The subject of President Kelly's discourse was a plea to halt the movement away from and a return to our old American ideals.

• Joins National Cotton Council

George H. Dockray, former textile engineer with the Research Institute at Temple University, has joined the staff of the National Cotton Council's Utilization Research Division.

Mr. Dockray's duties with the Council will involve keeping cotton textile mills abreast of research developments in textile processing and finishing fields. He is a graduate of the Philadelphia Textile Institute and served with the Eighth Air Force in England during the war. Prior

to his association with the Temple Research Institute, Mr. Dockray was textile engineer with several mills in the Philadelphia area.

• Monsanto Pamphlets

Four pamphlets, describing the use and function of Monsanto Chemical Company's Syton, an amorphous silican dispersion, in worsted, woolen, and commercial spinning and in carpet manufacture are available from the company.

Although the formula varies from mill to mill, Syton is added to the stock at the gill box in a stable emulsion made up with the mill's standard processing oil. It requires no special processing equipment. The results, by increasing interfiber friction, are said to be loftier yarns, with increased tensile strength, better parallelization, reduced waste, greater uniformity and stepped-up spinning speeds.

Each of the booklets contains chemical and physical data and results of recent mill trials.

• Eastman Chemical Catalog

Tennessee Eastman Corporation announces publication of the 1949 edition of *Eastman Industrial Chemicals,* an annual catalog compiled to offer purchasing agents, production superintendents, and laboratory directors a compact description of the various chemicals that Tennessee Eastman offers to industry.

Listed in the catalog are aliphatics, aldehydes, acids, anhydrides, esters, and alcohols. In the aromatic series are found anilides, amines, aminophenols, phenols, and phenol ethers. Other Eastman Industrial Chemicals listed include cellulose products and several inorganic chemicals, such as technical manganese sulfate, iron oxide, and zinc thiocyanate.

Copies of *Eastman Industrial Chemicals, 1949* may be obtained upon request to Tennessee Eastman Corporation, Kingsport, Tennessee.

• Waltz Promoted by Du Pont

Dr. Joseph E. Waltz, who has been associated with nylon research since his employment by the Du Pont Company in June, 1941, has been promoted to the position of a research supervisor.

Dr. Waltz is a graduate of Indiana University, where he received a bachelor of arts degree in chemistry in 1937 and a doctor of philosophy degree in physical chemistry in 1941.

He was a research chemist on the nylon development from 1941 until September, last year, when he was made a junior research associate. Dr. Waltz is on the staff of The Carothers Research Laboratory at the Experimental Station in Wilmington.

• Koppers Bulletin

The Chemical Division of Koppers Company, Inc., Pittsburgh 19, Pa., has issued a new 27-page technical bulletin describing the physical and chemical properties and listing important industrial uses of the highly fluorescent compound, beta-Methyl Umbelliferone.

A derivative of coumarin or 1,2-benzopyrone, beta-Methyl Umbelliferone undergoes chemical reactions typical of both the phenolic nucleus and the lactone linkage. Its chemical reactions include many of those common to both resorcinol and esters. The compound serves for the synthesis of many unusual derivatives not readily prepared from other starting materials.

Koppers beta-Methyl Umbelliferone is said to be valuable as a whitening agent or "optical bleach" for soap and soap products and as a screening agent for the elimination of ultra-violet rays. The blue fluorescence exhibited by this compound suggests its use as a masking agent in materials having a slightly yellow cast.

Data and graphs showing the ultraviolet and infrared absorption spectra, as well as the fluorescence spectra of the compound are included in the booklet along with 46 references to pertinent technical and patent literature.

Copies of Technical Bulletin No. C-9-111 will be sent upon request.

• Monsanto Appointment

W. Kenneth Menke of St. Louis has been appointed assistant general manager of sales for the Merrimac Division of Monsanto Chemical Company, it was announced recently by general sales manager, H. J. Heffernan.

Mr. Menke, who for the past two years has been assistant director of the company's Development Department, will assume his new duties June 1.

• Textile Coating Product

A new base white organosol for textile coating has been developed by The Watson-Standard Co., 225 Galveston Avenue, Pittsburgh 30, Pa. Called Watson-Standard 11-174A, the new coating is a high solids vinyl organosol type which is said to provide an easily handled daub for the coater.

Watson-Standard 11-174A furnishes a textile coating which is said to be economical, possesses good "hand", excellent ultra-violet resistance and which can be printed over easily. It is stated that this base white is exceptionnally good for coating textiles in making plastic tableclothes and similar items.

• Manual on Open House Programs

A manual on conduct of Open House programs, compiled from the actual experience of dozens of plants, which was recently authorized by the Textile Committee on Public Relations, has been completed by Dudley, Anderson & Yutzy, 551 Fifth Avenue, New York 17, N. Y., the Committee's public relations counsel.

The manual is the first of a series to deal with various community relations techniques—press relations, local radio shows, employee publications, community advertising, recreational and social programs, and similar topics.

The Open House Manual outlines the experience of various companies in choosing an objective for the program, holding various types of Open House, procedures for issuing invitations, training guides, and handling publicity. An actual budget together with brief case histories of more than a dozen programs in varied industries are given.

• Improved Nylon Size

The DuPont Company announces an improved sizing material for nylon continuous-filament yarn.

Similar in most respects to the resin textile size, formerly offered under the trade-mark "Tyze" 1, it is stated that the new material has been modified to eliminate dusting and is known as "Tyze" 2 resin textile size.

"Tyze" was developed in the Du Pont laboratories specifically for sizing nylon and was first offered to the trade late in 1947. It is claimed that it is now widely employed particularly for warp-sizing nylon, and that its strong affinity for nylon and its water solubility point to its use in other sizing applications.

• Increases Raw Material Production

Hilton-Davis, Cincinnati, is currently producing some 40 different intermediates in its own plant on Langdon Farm Road in Cincinnati, which formerly were purchased from outside sources, according to the latest report made by Ross Hastie, director of purchases.

"Based on tonnage, Hilton-Davis is now more than 75 per cent self-contained on raw materials used in producing its main line of organic pigments and dyes," the report revealed.

The plan of the expansion program still under way is to make the Hilton-Davis operation as nearly basic as is economically feasible, it has been announced.

T. W. Kitchen

• Kitchen Named Sales Head

T. W. Kitchen, former General Superintendent of the Finishing Plant at Dan River Mills, has been placed in charge of textile machinery Southern sales for Rodney Hunt Machine Co. of Orange, Massachusetts. Mr. Kitchen began his textile career with Joseph Bancroft & Sons, Wilmington, Delaware, and later was Superintendent of Plant of North Carolina Finishing Co., Salisbury, N. C. Before going with Rodney Hunt, Mr. Kitchen was General Superintendent of the Finishing Plant at Dan River Mills, Danville, Va.

As a base for Mr. Kitchen's operations, Rodney Hunt expects to establish a Southern office in the near future. Expansion of their line of textile finishing machinery has reached such proportions, the company explained, that direct selling has become a necessity. Mr. Kitchen will be available to Southern mills on all problems associated with the installation or operation of textile finishing equipment manufactured by Rodney Hunt Machine Co.

F. W. Warrington Company who, in their capacity as manufacturers' agents have been selling Rodney Hunt equipment, are no longer associated with this company by mutual agreement. It was stated that Southern interest in Rodney Hunt's line of textile wet finishing machinery and general acceptance of such proven developments as the "Tensitrol" principle have reached the point where it is difficult to reach all customers and potential customers without direct factory representation. Therefore, this change in conditions has made necessary the change from indirect representation to direct representation, which it is expected will reflect in closer contact between the users of machinery and the manufacturer.

• Polymers Guide

A guide to the way in which polymers are used in the textile industry has just been published by Polymer Industries, Inc., 1108 30th Ave., Astoria, New York. It describes how compounds, blends and modifications of polymers are processed to obtain printing gums, sizes, and finishes.

Copies may be obtained without charge.

• Morehouse Appointment

Appointment of H. M. Van Horn, 508 Noble St., Philadelphia, Pa., as representative for Morehouse Speedline Mills in the greater Philadelphia area has just been announced by Morehouse Industries, Los Angeles, Calif.

A warehouse, offices and laboratory have been opened at the above address. Facilities include a mill installation for giving demonstrations in grinding, mixing and processing various types of materials under actual plant conditions. Interested manufacturers are invited to visit the laboratory to observe a typical mill in operation and for test runs on their particular products.

• New Foxboro Bulletin

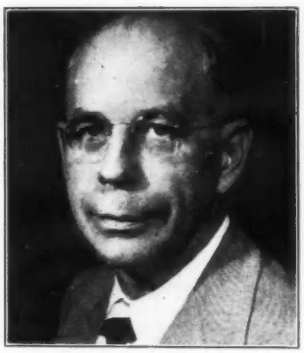
A 16-page bulletin, No. 430, just issued by The Foxboro Company, Foxboro, Mass., describes and illustrates the equipment by that company for the measurement and control of pH in industrial processing operations. Copies of the bulletin will be sent on request.

A foreword gives an explanation of the pH value and its effects, good or bad, on product quality, plant efficiency, and operating profits. Case histories are cited from numerous industrial fields to illustrate the importance of dependable pH control. The theory which is applied in actual pH control instrumentation is explained in text and diagrams.

• Bulletin on Bausch & Lomb Refractometer Available

Features of a new Bausch & Lomb refractometer, the "Abbe 56" are described in *Laboratory Equipment Bulletin No.* 108, recently released by Will Corporation, Rochester 3, N. Y., suppliers of laboratory apparatus.

The bulletin also announces a new Universal Cell Holder said to accommodate various sizes of absorption cells as an accessory for the "Kromatrol" photoelectric filter photometer, and a new, small, self-contained autoclave sterilizer. Copies of Bulletin No. 108 are available from the company. Write Dept. ADR.



James F. Thompson

• Sterling Drug Elects

At a meeting of the board of directors of Sterling Drug, Inc., James Hill, Jr., president, was elected to the additional office of chairman of the board, succeeding the late Edward S. Rogers.

Filling a vacancy on the board, J. Mark Hiebert, M. D., vice-president, was elected a director.

At the same time, the board elected James F. Thompson as a vice-president of Sterling Drug, Inc., in charge of The Hilton-Davis Chemical Co. Division, Cincinnati, manufacturers of pigments, dyestuffs and flushed colors for the printing ink, textile and other industries.

• Antara Adds New Detergents

Five new anionic foaming detergents, known as the Antarons, were recently added to the list of Antara Products, General Aniline & Film Corp., 444 Madison Avenue, New York City.

The new anionics are alkyl amide sulfonates and are companion products to Antara's non-ionic Antarox series—the aromatic and aliphatic polyglycol esters and ethers.

Like the Antaroxes, the Antarons are designed by number, each having different characteristics and properties.

Antaron L-135 is a mixture of alkyl amide sulfonate and sodium chloride and comes as a light yellow powder. It is stated that this product is soluble in water and electrolytic solutions, and is stable to acids, alkalis, and temperature change. It has a density of 0.54. It is used for most general cleaning operations including washing woolens, and fine fabrics.

Antaron L-177 is a more concentrated form of Antaron L-135. It has the same stability and solubility, but has a density of 0.76. It may be used where Antaron L-135 is used, but its concentration must be kept in mind.

Antaron L-135 and Antaron L-177 are among the few synthetic detergents which, it is claimed, when combined with ordinary soaps, will improve their performance. Not only do they claim improved detergent action, but also dispersal of insoluble compounds which are generally formed between ordinary soaps and hard water salts. It is said that because both these products are water-soluble, they may be blended readily into liquid soaps to improve their performance in hard water.

Antaron N-185 is a similar product which comes as a buff-white powder with a slightly sweet odor. This product is claimed to be soluble in water, hard water and moderately soluble in electrolyte solutions. It is also said to be stable in acid solutions, alkaline solutions, metal ions, boiling water and on storage. The greatest application for Antaron N-185 is said to be in the prevention of curd formation of 2,4;-D amine salts in hard water. This product is said to replace soap as a detergent base for laundering, and commercial woolen and fine fabric washing.

Antaron L-114 is a light yellow gel. This product is said to be stable in acids. alkali, hard water, metal ions, boiling water and on storage; also soluble in water and hard water and moderately soluble in electrolyte solutions and ethanol. Antaron L-114 may be used in most of the places that Antaron N-185 is used, except in the dispersing of 2.4-D amine salts in hard water.

Antaron R-275 comes as grey-white powder. It is claimed to be stable in hard water, metal ions, boiling water and on storage, as well as soluble in water, hard water and electrolyte solutions. Its density is 5.7. It may be used as a wetting agent where acid or alkali stability are required, and also when combined with Antaron L-135 it may be used in wettable DDT powders.

• Dr. Taylor Recipient of Sigma Xi Award

Dr. James L. Taylor, Professor of Textile Engineering at the Georgia Institute of Technology, received on Wednesday evening, June 8, the Georgia Tech Sigma Xi Club Research Award in recognition of his contributions to textile chemistry through research on ramie fibers. In connection with the Award Dr. Taylor presented an address on "The Place of Research in the Textile Industry." The meeting was held in Brittain Dining Hall on the Georgia Tech Campus.

Dr. Taylor was born in Knoxville, Tenn. in 1904, and attended Ohio Wesleyan University from which he received a B.A. degree in chemistry in 1929. He received his M.S. degree in chemistry from Syracuse University in 1932 and his Ph.D. in chemistry from the University of North Carolina in 1944. Both before and since receiving his doctorate, he has been at Georgia Tech engaged in teaching and research on textile products, ramie, warp sizing, and nylon under the auspices of the Engineering Experiment Station. In addition, he has spent considerable time visiting various mills and plants studying textile processes.

The Award which Dr. Taylor received was established three years ago by the Sigma Xi Club through the generosity of M. A. Ferst and is designed to recognize the Tech faculty member who has published the most significant research contribution in science or engineering during the past year. Previous winners of the award are Dr. P. K. Calaway, for his research in fundamental organic chemistry and Dr. R. S. Ingols for research in sanitary chemistry.

• Robinette Elected Chairman Philadelphia A.I.C.

Hillary Robinette, Jr., research director of Amalgamated Chemical Corporation, Philadelphia, was elected chairman of the Philadelphia Chapter, American Institute of Chemists, at a recent meeting. He succeeds Dr. Helmuth Pfluger, of Merck & Company, Rahway, New Jersey.

Other officers elected include: C. P. Neidig, Atlantic Refining Co., Vice-Chairman, succeeding Mr. Robinette; John Staub, Barrett Division of Allied Chemical & Dye Corp., Secretary, re-elected; and Charles W. Rivise, of Caesar & Rivise, Philadelphia representative on the national council, re-elected.

An honorary membership in the Philadelphia Chapter was presented to Dr. E. R. Weidlein, director of the Mellon Institute, who spoke on the organization and activity at the Institute's Pittsburgh laboratory. The presentation was made by the national president of the American Institute of Chemists, Lawrence Flett, of the National Aniline Division of Allied Chemical & Dye Corp., New York.

• Du Pont Appoints Staudt

Ambrose W. Staudt, manager of the Du Pont Company's Nylon Technical Service Section for the last four years, has been appointed manager of the Market Research Section of the company's Trade Analysis Division, it was announced recently by Luther D. Reed, director. Mr. Staudt will be succeeded by George H. Braniff, who has been assistant manager of the Nylon Technical Service Section for the last year.

A member of the nylon organization since early pilot-plant days in 1936, Mr. Staudt was successively an area supervisor at the Seaford, Del., plant, chief supervisor and later technical superintendent of the plant at Martinsville, Va.

• Rohm & Haas Reduces Prices

A reduction of 2c a pound in the prices of its textile reducing and stripping agents in drum quantities and over was announced recently by the Rohm & Haas Company. Materials affected by the reduction include concentrated sodium hydrosulfite, sodium sulfoxylate formaldehyde and basic zinc sulfoxylate formaldehyde; as well as zinc hydrosulfite which is reduced 1½c a pound. These chemicals are sold respectively under the trade names Lykopon, Formopon, Formopon Extra and Protolin W.

• Bartlett Elected to N.I.C. Board

Edwin R. Bartlett, president, Hooker Electrochemical Company, was elected a board member of the National Industrial Conference Board for the coming year at the Board's 33rd Annual Meeting held May 25, 1949 at the Waldorf-Astoria Hotel in New York.

The Conference Board, founded in 1916, is an independent, nonprofit organization which gathers, tests, distributes, and explains facts essential to the establishment of management, labor, governmental and economic policies that accelerate industrial progress and thus promote the prosperity of the American people. The Board's work is supported by more than 3,000 business concerns, labor unions, government bureaus, libraries, colleges and universities.

• Market Data on Soap-Making Chemicals

During 1948-9 *Soap and Sanitary Chemicals* published a series of Market Research articles on soap-making chemicals as prepared by Dr. John R. Skeen of Foster D. Snell, Inc., 29 West 15th Street, New York 11, N. Y. The specific subjects are tallow, tallow acids, olive oil, coconut oil, palm oil, fish oils, whale oil, rosin, caustic soda, soda ash, trisodium phosphate, and sodium pyrophosphate. In general the data show for each of the past ten years, production, consumption in detergents, imports or exports if any, and average annual price per pound, varying as to form slightly from product to product. All have now been reprinted in a photo offset edition of which a copy is available on request to Foster D. Snell, Inc.

OBITUARY

ANTHONY D. NAZZARO

ANTHONY D. NAZZARO, who was associated with the Lyons Factoring Company, died on June 1st in St. Joseph's Hospital, Paterson, New Jersey. He was 68 years old and had been a leading figure in the textile industry in the Paterson area for many years.

Mr. Nazzaro was born in Italy and came to this country in 1900. He was a pioneer in the tin-weighting process and was formerly president of the Perfection Silk Dyeing and Finishing Company and the Victory Dyeing and Finishing Company. These concerns were later liquidated.

Three sons are officers of the American Textile Processing Company of Paterson: Dr. Rocco, president, Attilio D., Vice-President, and Armand L., Secretary.

Book Reviews

Surface Active Agents

A. M. Schwartz and J. W. Perry, Interscience Publishers, Inc., New York, 579 pages, price $10.00

At last a complete and authoritative classification, listing, and partial evaluation of the surface active agents is available to the textile chemist. This volume includes the agents available for uses other than textile, but very properly gives particular emphasis to the textile processing agents. Included in the introduction is a very useful method of classification of the surface active agents from the standpoint of structure. Part I discusses the agents from the standpoint of their synthesis and manufacture. Part II, on the physical chemistry of surface agents in theory and practice, is by far the best portion of the book, however, and should be required reading for everyone who attempts to add another standard detergency test to the long list now present. The authors' conception of surface versus bulk properties of solutions of these agents is calculated to rid the reader's mind of popular misconceptions of the mechanisms of detergency and wetting. Part III, on practical applications, is the least satisfactory part of the book, amounting to little more than a listing of known uses for specific agents. This reviewer can whole-heartedly recommend this excellent book to the textile processing industry.—J.H.S.

The Story of Silk

William F. Leggett, XIV + 361 pages, Lifetime Editions, Inc., New York, N. Y. 1949. $5.00

This book, written in narrative fashion, makes very interesting and informative reading. The scope of the book is primarily historical; but several chapters are given to the silk fiber and its properties, the silk moth and its cultivation, the types and location of the various wild silk moths, and the history and cultivation of the mulberry tree. There is also a chapter devoted to the history and description of silk lace.

Historically, the author traces and describes silk cultivation in the various silk-producing countries of the world from the very ancient Chinese down to the present. Each of seventeen different chapters is devoted to silk moth cultivation in different countries with reasons as to why silk production was or was not successful. There is one chapter on silk production in America which contains many interesting and surprising facts.—J.B.M.

Absorption Spectrophotometry

G. F. Lothian, Hilger and Watts, Ltd., London 1949, 196 pages, price $7.60

This volume is an attempt to present the laws governing the absorption of electromagnetic waves in the ultraviolet, visible, and infrared regions by chemical media, and includes examples of practical ways in which typical problems in research and analysis may be solved by the use of these laws; as a matter of fact, much more of the space is devoted to infrared absorption than to the other two regions. The book is divided into three sections: Principles, Applications, and Techniques. The style and coverage of the text seems to be mid-way between a laboratory manual and a text book; perhaps it could be best described as a laboratory manual with a minimum amount of text concerning the principles involved. This presentation naturally suffers from incompleteness of explanation and perhaps too much detail on certain specific instruments (only English instruments are considered in any detail) but some such criticism is bound to be made of any book which is a compromise, as this one obviously is. In view of the author's limitation to English and particularly Hilger instruments, the book will not be as useful in this country as it would be abroad; it would be of value principally to men actually engaged in absorption spectrophotometry.—J.H.S.

Moisture in Wool—

(*Concluded from Page 484*)

it were not pursued for that length of time. Although, theoretically, vacuum drying over P_2O_5 is a faultless method, practical applications offer considerable difficulties and it should be used only with considerable caution.

Moisture determination by means of toluene distillation would appear to have many theoretical advantages. Boiling toluene does have an elevated temperature and supplies a constant source of heat so that the evaporation of moisture from the sample will be rapid and presumably tend to be complete. Another advantage is that the boiling toluene vapors continuously remove the moisture from the atmosphere in contact with the sample being dried. This insures that the final atmosphere in equilibrium with the sample will be completely anhydrous, and hence, that the sample itself must finally become *completely* dry. Practical advantages of the toluene distillation method are that it is direct reading, fairly rapid (2 to 3 hours), and does give rise to constant and reproducible readings. A possible objection would be that high moisture contents demonstrated by toluene distillation would merely indicate lost degradation products of the wool. This point was tested by examining the water distilled by toluene from wool samples. There was less than 0.01% of CO_2 and of nitrogen containing products distilled along with the water from the sample, so apparently toluene distillation at the same time it achieves the highest moisture findings of any method derives very little of these findings from anything else than the moisture in the wool. It would appear that toluene distillation (or some similar technique) would be the most reliable reference method for testing the moisture in wool samples.

In agreement with the above considerations the toluene distillations gave the highest values in these tests. In these experiments moisture testing by toluene distillation is the only method that can be considered to possess an inherent absolute accuracy. (Blank tests on known amounts of water gave good checks.) At the same time toluene distillation presents fire hazards and is more inconvenient than the usual oven procedures.

Oven drying at 110°C. yields results only slightly higher than vacuum drying over P_2O_5 and considerably under the results obtained by suction drying at 150°C. and forced draft drying at 150°C. This, of course, is understandable. Any wool sample dried in a moist atmosphere must remain in equilibrium with that atmosphere and if the atmosphere is at a relatively low temperature the sample must hold relatively large quantities of moisture. Samples dried at 110°C. must inevitably show lower moisture contents than samples dried at 150°C.

The moisture findings with the suction drier of the U. S. Department of Agriculture and those with the forced draft oven are rather close. A slight advantage appears to lie with the forced draft drier since it averages 6.65% moisture as compared with the 6.59% moisture obtained with the suction drier. However, it is possible that these higher moisture findings were due to the greater difficulty in controlling the temperature in the forced draft drier. These were set to operate at a temperature of 145°-150°C. and yet in the preliminary coming to temperature they would reach temperatures as high as 175°C. at the top of the wool sample in the drying can. This, of course, suggests the possibility of degrading the wool and removal of volatile constituents from it. Tests indicated that drying in the forced draft drier, set at 150°C., would cause the extractions in the sample to be low by about 0.1% and would also cause appreciable quantities of CO_2 and sulfur compounds to evolve.

It would appear that moisture tests in a conditioning oven at 100°C. would be deficient to the extent of about 0.56%; tests in a conditioning oven at 150°C. would be deficient to the extent of about 0.38%; and tests in a forced draft drier would be deficient to the extent of about 0.32%. No method of testing for moisture in wool, made on the basis of heating the sample, can be considered reliable unless the atmosphere with which the wool is brought to equilibrium is essentially anhydrous. It would appear that accurate and convenient testing for maisture in wool would depend upon development of a conditioning oven which would operate at elevated temperatures and at the same time be supplied with a continuous supply of anhydrous air.

Conclusions

1. Toluene distillation appears to be the most accurate method (herein tested) for the determination of moisture in wool.

2. Drying of wool with hot air in conditioning ovens or various forced draft ovens gives incomplete results for moisture, apparently because present-day ovens operation in atmospheres containing appreciable amounts of moisture.

3. Present-day conditioning ovens or forced draft driers might yield accurate results if means were developed for a continuous supply of anhydrous atmosphere.

Dimensional Changes—

(*Concluded from Page 483*)

The greatest change usually took place in the first laundering. Progressive shrinkage occurred in both length and width of the wool fabrics and in the length of the plain knit nylon materials. Progressive shrinkage or stretch was not pronounced in the others.

All fabrics except the plated nylon of 40 courses per inch exhibited considerable lengthwise shrinkage. Several stretched or shrank widthwise. Smaller changes in lengthwise shrinkage were found in fabrics knit with 40 courses per inch than those knit with 32 courses per inch, also, plated fabrics shrank less than plain knit fabrics.

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A few copies of the AATCC Silver Jubilee Issue (December 2, 1946) are still available at $1.25 per copy

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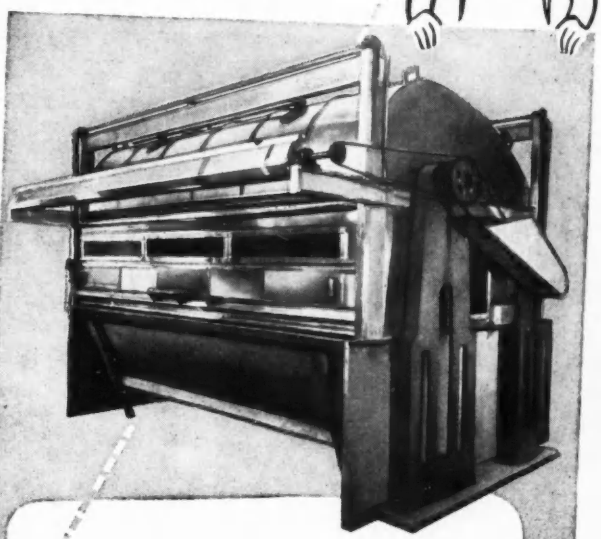

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For, in an emergency as at all other times, a Micromax can step the amount of chemical either up or down, to the limit of the valve or feeder capacity, and still hold the chemical in strict, constantly-proportioned balance with the condition of the water being treated. It frees the water plant from an enormous amount of manual work, and at the same time gives the manufacturing departments a clear well of far more uniform water than most operators can supply under manual control. And Micromax saves chemical because it ends over-treatment.

Micromax pH Controllers can be applied at the desired point in practically any water-treating cycle. An L&N engineer will be glad to supply technical information.

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LEEDS & NORTHRUP

MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

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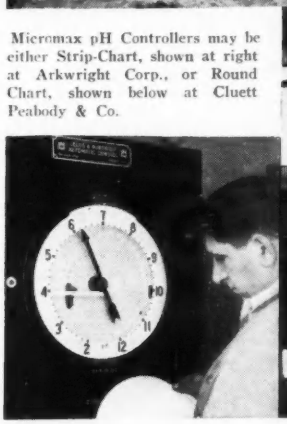
Micromax pH Controllers may be either Strip-Chart, shown at right at Arkwright Corp., or Round Chart, shown below at Cluett Peabody & Co.



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POSITION WANTED: Textile Chemist, Age. 29, broad experience in wet processing and dyeing of cottons and rayons. Formerly in charge of laboratory and dyehouse of well known organization. Superintendent material. Write Box No. 635.

WANTED—Finisher for modern piece goods finishing plant. Must be experienced with all types of synthetic, spun and filament fabrics. Also must be experienced with resin finishes. Write Box No. 628.

POSITION WANTED—Manager-Superintendent, commission dyeing and finishing. 25 years' experience on wool, worsted, cotton rayon and blended fabrics. Piece yarn and stock dyeing. Textile and business school trained. Excellent references. Write Box No. 641.

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National known Textile Chemist with long experience in manufacture of textile auxiliaries, resins, detergents, and in textile finishing applications. Available as Research Director for established company in this line, or willing to join with salesman or sales organization in a manufacturing enterprise. Philadelphia area preferred, but not essential. Write Box No. 645.

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WANTED — SULFONATION EXPERT. Manufacturer in New York City area seeks consultant for sulfonation animal and vegetable oils. Replies strictly confidential. Write Box No. 652.

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WANTED—Salesmen or Manufacturer's Representatives to sell soaps, detergents, etc., to textile mills, laundries, etc.; New England and Virginia-Carolinas territories open. State full particulars. Write Box No. 654.

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POSITION WANTED: Swedish-American textile chemist, Swedish engineering and commercial education, with good knowledge of cotton and rayon finishing and wet processing in general, desires suitable position, preferably in New England, Laboratory and mill experience. Special interest: resin application. Have worked with crease-resistance. Familiar with textile testing methods and auxiliaries. Sales experience. Now living in Sweden. American and Swedish references. Age 26. Married. Write Box No. 658.

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WANTED: Dyer for the dyeing of plain fabrics and also for the dyeing of goods in preparation for roller and screen printing. Knowledge of handling rayon, acetate and silk required. Write Box No. 659.

POSITION WANTED—Chemical Engineer, PH Degree, European. Actual residence South America. Seeking corresponding situation. Several years' practice in textile and auxiliary products. Speaking languages. Write: Andrew T. Kovats, 1440 Montrose Ave., Chicago 13, Ill.

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Launder-Ometer

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*AQUAROL: A water repellent for processing woolen, cotton and rayon fabrics, also produces excellent results in splashproofing or finishing all types of hosiery.

*PARAMINE T A: A cation active softener for processing cotton and rayon cloth to obtain a soft, smooth, pleasing finish.

ANTHOMINE: Auxiliary used in all wool dyeing processes to produce a uniform shade and impart a soft pleasing hand to stock, yarn and cloth. Improves exhaustion of dye bath and increases color yield. Very effective for levelling shade of tippy and mixed wools.

*PARAPON S A: A highly efficient leveler and softener for dyeing and finishing all types of yarn, cloth and hosiery to produce a uniform dyeing and a soft full hand.

*ARIPEL F S: Finish and gas inhibitor for processing dyed acetate rayon—produces a soft, full feeling finish and prevents gas fading of the color.

*LANITOL F: A synthetic detergent possessing exceptional scouring and washing properties for processing wool, cotton, rayon or nylon.

*ALGEPON V A: Auxiliary used in dyeing vat colors to retard reoxidation of the reduced bath and produce a solid and uniform shade—also effective in stripping vat dyeings.

*CULOFIX: Used as an after treatment in last rinse to prevent bleeding of direct dyed cotton or rayon in water.

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*TETRANOL: A rapid wetting and penetrating agent. Active in acid, alkaline and salt solutions and not affected by hard water, may be used in all types of dyeing operations to insure positive penetration of color and a uniform and solid shade.

And a complete line of Oils, Chemicals, Softeners and Finishes for Wet Processing All Textile Fibres

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Newark, New Jersey

Manufacturers of Industrial Chemicals for Over 40 Years

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New Rohm & Haas Desizing Agents Pay Immediate and Cumulative Dividends in Faster Processing.

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We shall gladly submit samples for trial runs if you will state your problems.

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KNOXVILLE, TENN. HAMILTON, ONT., CANADA

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Photo courtesy of American Bemberg Corp.

AMBERTEX M provides the razor-sharp detail that makes small, figured patterns fairly *dance!* What is it? An entirely new, ready to use printing thickener that replaces conventional, cook up British Gums for *Vat Colors*—

And delivers results like these . . .

AMBERTEX M adds the excitement of *sharp* outlines to small or complex patterns. Color yield? In one plant, 20 per cent higher than ever before! AMBERTEX M deposits a soft, pliable film—ideal for Bemberg sheers and similar materials. Excellent penetration minimizes mark-offs. Produces smooth, uniform blotches. Washes out easily and thoroughly!

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intricate patterns

... without distortion

New!

A VAT THICKENER FOR

RAYON and COTTON PRINTING

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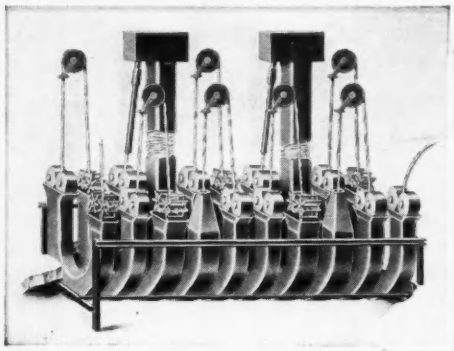
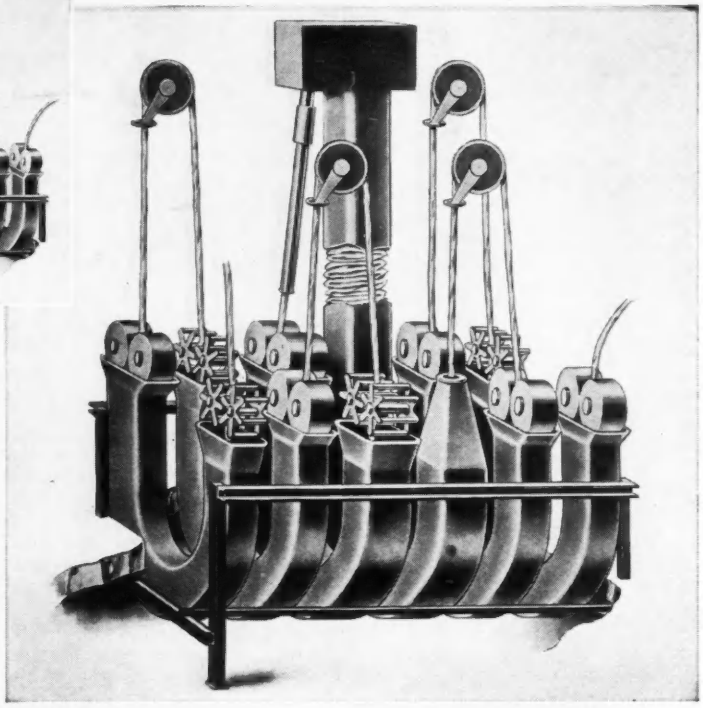
STARCHES — AND SPECIALTIES WITH EASILY DEMONSTRATED SUPERIORITY



*Patent Pending

Side view of the two-stage Butterworth Junior Bleaching Unit, showing "U" type Washers, Saturators, Squeezers and J-Boxes.



Butterworth Junior Bleaching unit, single stage system, showing Squeezer, "U" type Washers, Saturator and J-Box. Note compact size of the bleaching unit, and stainless steel construction.

Junior does a "Man-sized" Bleaching Job

If your production does not warrant a full-sized continuous bleaching range, yet you want the benefits of continuous bleaching, here is the range for you!

You can do high-speed continuous bleaching in a fraction of the floor space formerly required. You can bleach knit goods or cotton piece goods in an area *13 feet long* and *16 feet wide!* Here is a single-stage bleaching unit extremely compact in size, yet so functional and efficient it handles cloth at an average rate of 50 yards per minute.

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Let us show you how JUNIOR can do a "Man-sized" bleaching job for you. Write or call.

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In stockings sheer (so snuggly fitting!)
And finished right with DuraBeau*

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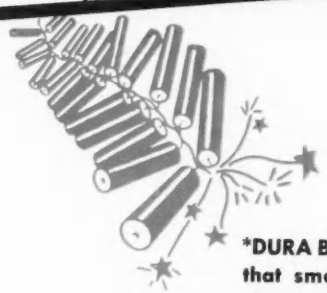

*DURA BEAU finishes give milady's hosiery that smooth, delicate, smoky-dull, ultra-sheer touch of beauty . . . the film of protection that adds not only eye-appeal but definite resistance to snags, runs, pulls and spots . . . DURA BEAU is the finish that gives fine hosiery more DURAbility . . . more BEAUty!

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—reg. U.S.A. and Canada

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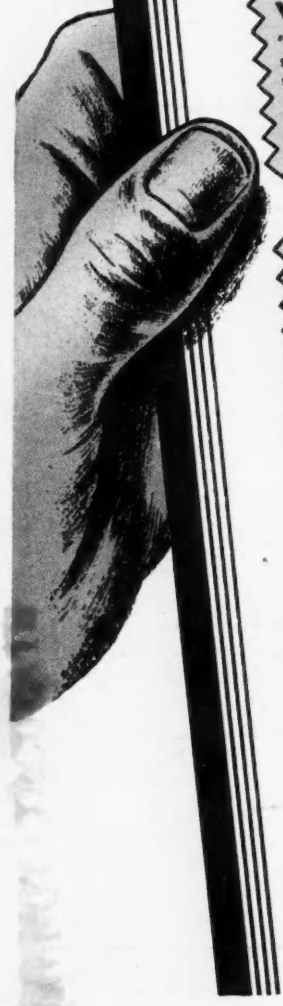

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A concentrated, fast-working, powdered, desizing agent containing enzymes which will remove starches or proteins. For use in any conventional desizing machine.

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A dust-free, white crystalline reducing agent. Soluble, colorless, excellent for stripping wool rags, shoddy, acetate or Nylon fabric.

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"For brighter vat dyed colors on cotton, linen and rayon. Use this powerful concentrated reducing agent for faster, cleaner results on wool, cotton and rayon."

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"A blend of vegetable oils and specially selected fats for a superior, non-foaming, finishing oil. High in combined SO_3 and stability. Excellent for sanforizing."

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A concentrated reducing agent, highly stable at high temperatures, outstanding for discharge printing. Employed successfully wherever the reducing agent must dry into the fabric and retain its reducing power.

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An improved textile gum of laboratory-check viscosity for printing on all fabrics, especially silk, and synthetic fibres.

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A refined, no-stain gum, proved valuable in achieving purest possible white effects in discharge printing.

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A highly sulphonated castor oil used as a staple penetrant for dyeing or bleaching in leading textile mills.

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"A high-test wax emulsion type water repellent finish having extreme stability both in the barrel and in diluted form as used. Non-foaming."

ZIPOLITE*
"A superior detergent and wetting agent, effective in acid and alkaline liquors at all temperatures from cold to boiling."

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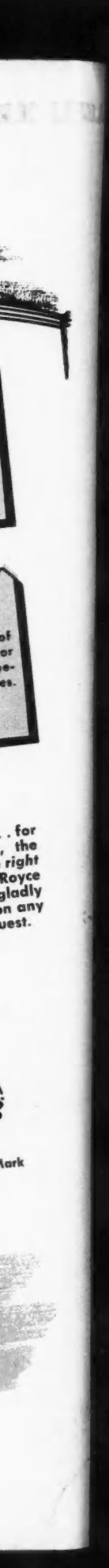
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